

DESERT RENEWABLE ENERGY PROJECTS



RENEWABLE ENERGY ACTION TEAM REPORT

The logo of the California Department of Fish & Game is a shield-shaped emblem. It features a yellow background with a blue border. Inside the shield, there is a stylized map of California in blue, with a yellow fish swimming in the water. Above the map, the text "RESOURCES AGENCY" is written in blue. Below the map, the text "CALIFORNIA" is written in large, bold, blue letters. To the right of the map, the text "DEPARTMENT FISH & GAME" is written in blue. At the bottom of the shield, there is a yellow bear walking to the right.

U.S. Fish and
Wildlife Service

RENEWABLE ENERGY ACTION TEAM MANUAL

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RENEWABLE ENERGY ACTION TEAM APPROVALS

The Renewable Energy Action Team (REAT) agencies--California Energy Commission, California Department of Fish and Game, U.S. Bureau of Land Management, and U.S. Fish and Wildlife Service jointly prepared the *Best Management Practices & Guidance Manual: Desert Renewable Energy Projects*. The manual fulfills agency commitments in Governor Schwarzenegger's Executive Order S-14-08, Secretary of the Interior Salazar's Order No. 3285, and related memoranda between California and the U.S. Department of Interior, and between the REAT agencies (signed in 2008 and 2009). The manual's best management practices and guidance are voluntary and do not duplicate or supersede the National Environmental Policy Act (NEPA), California Environmental Quality Act (CEQA), Warren-Alquist Energy Act, Federal Endangered Species Act, California Endangered Species Act statutes, or other legal requirements. This document does not alter lead agencies' obligations under NEPA, CEQA, or the Warren-Alquist Energy Act, nor does it mandate nor limit the studies, mitigation, or alternatives that an agency may require. The manual's information does not implement, replace, duplicate, interpret, amend, or supplement current statutes or regulations.

SIGNATURES:

Dated: _____, 2010

CALIFORNIA DEPARTMENT OF FISH
AND GAME

By: _____

Title: _____

Dated: _____, 2010

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ABSTRACT

Best Management Practices and Guidance Manual: Desert Renewable Energy Projects provides recommendations to renewable energy developers, and federal, state, local, and tribal governments for improving the efficiency of the regulatory process in California and protecting environmental and cultural resources, and human health and safety. The manual carries out portions of California Governor Executive Orders S-14-08 and S-21-09, and the United States Department of Interior Secretarial Order 3285 on renewable energy resource development. The manual recommends strategic actions, a process for initiating permitting discussions, guidance and best management practices for timely processing of desert renewable energy project permits within the established regulatory framework. The manual does not recommend changes to laws, regulations, or agency jurisdictions or responsibilities. The advice includes voluntary 1) application preparation guidance for renewable energy projects located in the California desert region and 2) best management practices for the desert renewable energy facility permitting/pre construction, construction, operation, repowering or retrofitting, and decommissioning phases. The manual also provides suggestions for project design features when developing such renewable energy projects.

Key Words: Air quality, best management practices, biological resources, biofuel, biomass , California, construction, cultural resources, decommission, desert, electricity, energy, environmental impact report, environmental impact statement, erosion, executive order, federal, geothermal, guidance, hazardous materials, land use, noise, operation, paleontological resources, permitting, power plants, regulatory framework, renewable, repower, retrofit, S-14-08, safety, Secretarial Order 3285, soils, solar, stormwater, traffic, transmission, transportation, visual resources, water supply, water quality, wind

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EXECUTIVE SUMMARY

Electricity generated from renewable energy sources is expected to serve a vital role in meeting California's energy needs. The state's renewable energy goal is for 33 percent of the electricity sold in California to be generated from renewable energy resources by 2020. At the same time California moves to achieve its renewable energy commitments, it must also maintain and protect the state's human, cultural, and natural resources.

Governor Schwarzenegger signed Executive Order S-14-08 on November 17, 2008 which not only established California's goal of increasing renewable energy generated electricity but also directed the California Natural Resources Agency to lead a joint collaboration between the California Energy Commission (Energy Commission) and Department of Fish and Game (DFG) to expedite Renewables Portfolio Standard (RPS) eligible renewable energy resources development. In addition, United States Department of Interior (DOI) Secretary Kenneth Salazar issued Secretarial Order 3285 in March 2009 to make renewable energy production, development, and delivery one of DOI's highest priorities. Governor Schwarzenegger and Secretary Salazar signed a memorandum of understanding (MOU) on October 12, 2009 to confirm commitments to renewable energy project development in California. These commitments include preparation of best management practices (BMPs) and interim guidance to assist solar, wind, and other qualified RPS project developers in designing and siting projects in an environmentally suitable manner.

The Energy Commission, DFG, Department of Interior's Bureau of Land Management (BLM), and U.S. Fish and Wildlife Service (FWS) collaboratively developed this *Best Management Practices and Guidance Manual: Desert Renewable Energy Projects*. The agencies form the nucleus of the Renewable Energy Action Team (REAT).

The manual incorporates extensive contributions from the Desert Managers Group, which was established in 2005 to develop coordinated and complementary management guidelines, practices, and programs to conserve and enhance the California deserts. Group partners include DOI bureaus/services, U.S. Department of Agriculture, State of California agencies/departments, and Kern, Imperial, and San Bernardino counties.

Electricity generated from renewable energy sources is expected to serve a vital role in meeting California's energy needs. As California moves to achieve its 33 percent renewable energy goal, it must also maintain and protect the state's valuable human, cultural, biological, and natural resources. This manual is a tool to help achieve the dual goals of renewable energy development while protecting important resources within the Desert Renewable Energy Conservation Plan (DRECP) area. The manual will assist desert renewable energy project interests in addressing renewable energy power plant projects effects on desert resources and meeting California's renewable energy goals.

Exceptional and rare plants, wildlife, and habitat exist in the deserts. Many desert areas have culturally significant resources including rock outcroppings, vistas, Native American sites, and the dry remains of ancient lakes, which sometimes had prehistoric settlements near the

shorelines. Laws, regulations, and government policies protect these resources and human health and safety from development related adverse and unacceptable effects.

The REAT agencies prepared the manual to: a) help desert renewable energy project developers understand and meet federal, state, and local renewable energy and environmental requirements; b) assist in developing renewable energy projects that minimize environmental impacts; c) assist developers and agencies with siting projects in environmentally suitable locations; d) assist regulatory agencies when reviewing and permitting renewable energy project applications; e) accelerate environmental review of renewable energy projects and local, state, and federal permitting processes, and f) guide qualified RPS project development and construction pending completion of a DRECP. While the pre-application filing guidance and BMPs are specific to renewable energy projects in the California deserts, they may be applicable in other areas of California and states where similar resource issues occur. For projects that involve resources not addressed in this manual, contact the appropriate regulatory and resource agencies in their respective areas or states for guidance.

This manual is offered to project developers and regulatory agencies when reviewing and permitting a renewable energy project application. REAT agencies expect that project applications already filed with and/or deemed complete by agencies would proceed through the environmental review and permitting decision processes following schedules identified by the lead agencies and required in laws and regulations. For projects with applications that have been submitted to agencies, but not accepted as complete, or for which applications are in earlier stages of development, it is expected the same process would apply after filing or being deemed complete: permitting decisions would continue to adhere to regulatory timeframes, and the individual requirements and policies of lead agencies.

As appropriate, completing the activities and practices listed in this manual will support efforts to comply with the National Environmental Policy Act (NEPA), California Environmental Quality Act (CEQA) and other federal, state, and local environmental, energy development and wildlife laws. Although incorporating appropriate and applicable BMPs/guidance/strategic actions into renewable energy project development would improve the regulatory process efficiency and speed, using of the manual's recommendations are voluntary.

There is inadequate time in an accelerated project review process to systematically address and resolve readily known and predictable issues associated with a project after filing an application. To assist agencies in reducing permitting timeframes project developers are advised to identify and address the issues by proposing appropriate project design features and environmental impact avoidance and mitigation measures in an application to the Energy Commission, a right-of-way application to BLM, and/or an application with another appropriate lead agency. Other agencies can include the U.S. Environmental Protection Agency, California State Lands Commission, or local governments. If appropriate pre-application filing actions are not incorporated into an application and the project design, or

the project is changed or modified after an application is filed, past experience indicates that significant delays are likely. The delays hinder the ability of BLM, the Energy Commission, DFG, FWS, and other agencies to process permits in a timely manner.

The following strategic actions have been effective in recent renewable energy project application proceedings in addressing the major significant issues that usually arise when conducting environmental reviews and facilitating an efficient regulatory process. The actions are numbered to assist review and discussion. The numbering sequence does not indicate the relative priority or importance of any action. Addressing most or all, as appropriate, before filing applications will help expedited agency reviews and decision-making. If the majority of the actions are not addressed it is likely that environmental review and decision-making will take additional time.

- 1) The renewable energy project is proposed to be located on land identified by the REAT and/or BLM as suitable for renewable energy development.
- 2) The project will use air-cooling technologies for thermal power plant cooling.
- 3) The appropriate biological resource surveys are completed during the appropriate season using the proper protocols.
- 4) A draft biological assessment (BA), draft application for Incidental Take Permits, and draft Lake or Streambed Alteration Agreement notification form, if applicable to the project, are as complete as possible and filed with applications to the appropriate lead agencies. The draft BA must include a complete draft project description, full description and assessment of project impacts and species affected, and project impact mitigation measures.
- 5) Cultural resource surveys required by lead agencies, and lead agency approved archaeological reports, tribal consultations, assessments, and project impact mitigation measures are completed following the proper protocols and standards.
- 6) BLM requirements and Resource Management Plans are addressed and incorporated in the project design, for projects located on BLM managed lands. Projects are consistent with guidance in the BLM programmatic wind and geothermal Environmental Impact Statements (EISs), and after publication, the BLM programmatic solar EIS.
- 7) Local agency requirements, including but not limited to local zoning, general plan policies, land use, water, hydrology, safety, aesthetics, noise, traffic, and height restrictions, are incorporated into the applications to lead agencies. The project is consistent with Williamson Act requirements, zoning ordinances, and general plan designations. If termination of a Williamson Act contract is required for locating a project on contracted lands, contract termination is in the final stages.

- 8) Department of Defense and nearby military installation requirements are addressed and incorporated into a project's design, ensuring that the project will not conflict with military operations.
- 9) Interconnecting the proposed project to the existing electric transmission system is shown to not negatively impact electric transmission system reliability. A transmission system interconnection study (California Independent System Operator [California ISO] Phase I, for example) is reviewed and completed by the California ISO or other control area operator. Measures for eliminating unacceptable degradation to the transmission system reliability beyond the first point of interconnection are identified and agreed upon.
- 10) For projects requiring local air quality management district or air pollution control district permits, include the proposed project determination of compliance or authority to construct application with applications to lead agencies.

Manual Public Review Process

The October 2009 draft version of this manual was reviewed by agencies, the public, local governments, renewable energy, community, tribal, and environmental interests. The draft manual was the subject of an October 13, 2009 public workshop in Victorville, California. Approximately 150 individuals representing the various interests discussed related issues, concerns, and suggested changes. In addition, the REAT established a public comment period that ended November 20, 2009. Written public comments were received from 18 organizations.

The December 2009 revised draft manual was based on comments received and discussions within the REAT. The public comment period for the December draft ended on January 27, 2010. Nine organizations provided comments and the comments served as the basis for further revisions and REAT agency discussions.

The September 2010 version was released and included the revisions; the public comment period extended from September 14 to October 27, 2010. Five comment letters were received and the REAT agencies carefully considered and addressed the comments in the current version of the manual. The REAT agencies thank the commenters for their participation during the October 13, 2009 public workshop, and overall, for their constructive input. The draft and final versions of the manual, as well as the comment letters are posted on the DRECP website: <http://www.drecp.org/meetings/index.html>.

CHAPTER 1: Introduction and Purpose

Electricity generated from renewable energy sources is expected to serve a vital role in meeting California's energy needs. The state's renewable energy goal is for 33 percent of the electricity sold in California to be generated from renewable energy resources by 2020. At the same time California moves to achieve its renewable energy commitments, it must also maintain and protect the state's human, cultural, and natural resources.

Governor Arnold Schwarzenegger issued Executive Order S-14-08 on November 17, 2008 which directs the California Natural Resources Agency to lead a joint collaboration between the California Energy Commission (Energy Commission) and Department of Fish and Game (DFG) to expedite the development of Renewables Portfolio Standard (RPS) eligible renewable energy resources. On September 15, 2009 the Governor signed Executive Order S-21-09 reiterating and strengthening S-14-08 by directing the California Air Resources Board (CARB) to work with the California energy agencies and adopt regulations to implement the 33 percent by 2020 renewable energy goal. U.S. Department of Interior (DOI) Secretary Kenneth Salazar's Order 3285, issued on March 11, 2009, establishes a policy of encouraging renewable energy production, development, and delivery as one of the Department's highest priorities. The Energy Commission, DFG, U.S. Department of Interior, Bureau of Land Management (BLM), and Fish and Wildlife Service (FWS) are working cooperatively and collaboratively to create a more efficient process for timely permitting of renewable energy facilities located in the California desert region.

The agency managers (Renewable Energy Action Team or REAT) are coordinating government regulatory actions among federal and state agencies and cities, counties, and special districts located in the desert region. The REAT is working to address regulatory approval requirements within a single coordinated process. The cooperation is necessary to carry out legislation, the Executive and Secretarial Orders, and related Memoranda of Understanding and Agreement (MOUs/ MOA) to address complex permitting issues within the existing regulatory framework. It is likely that any renewable energy project would require multiple permits, licenses, leases, agreements, consultations, or certifications before beginning operation. Refer to **Appendix A: Regulatory Framework** for information on agency and local government roles, authorities, and desert renewable energy related memoranda and legislation.

Manual Purpose and Intent

The *Best Management Practices and Guidance Manual: Desert Renewable Energy Projects* will: a) help desert renewable energy project developers understand and meet federal, state, and local renewable energy and environmental requirements; b) assist in developing renewable energy projects that minimize environmental impacts; c) assist developers and agencies with siting projects in environmentally suitable locations; d) assist regulatory agencies when reviewing and permitting renewable energy project applications; e) accelerate environmental review of renewable energy projects and local, state, and federal permitting processes, and f) guide

qualified RPS project development and construction pending completion of a Desert Renewable Energy Conservation Plan (DRECP).

The DRECP will identify Colorado and Mojave desert areas suitable for future renewable energy development and resource conservation, and include a related conservation strategy. In May 2009, the BLM identified four solar energy study areas within California, with the potential to designate them as solar zones by the end of 2012. The REAT is working with local governments and stakeholders, and soliciting public comments and independent scientific input/analysis while developing the DRECP. In March 2010, the REAT identified starting point maps. The current schedule calls for the REAT agencies to continue their planning, designate renewable energy development and conservation opportunity areas, and finalize the DRECP. Refer to <http://www.drecp.org/> for more information on the DRECP, including maps and related documents.

The REAT is developing the *Best Management Practices and Guidance Manual: Desert Renewable Energy Projects* based on recent and past project review, and regulatory experience and expertise of its agency staff. The staff have carefully considered and addressed comments from public agencies, local and tribal governments, community, recreational, and environmental organizations, renewable energy developers, and private citizens. The intent is to offer the document as a reliable resource for the parties involved in development and review of renewable energy projects to be located in the California Mojave and Colorado deserts.

This manual recommends: 1) guidance for initiating permitting processes and preparing applications to lead agencies during the pre-application phase (prior to agency acceptance of a renewable energy project application as complete for environmental review and permit processing) and 2) BMPs for the desert renewable energy facility post-application phases (permitting/pre-construction, construction, operation, repowering or retrofitting, and decommissioning) requiring regulatory review or action. This manual also provides project design feature recommendations for consideration when developing a desert renewable energy project. The REAT will revisit the applicability of the BMPs and guidance during development of the DRECP.

Information in the manual is specifically designed to be flexible to accommodate federal, tribal, state, and local concerns. Agencies with project approval authority are encouraged to consider and adapt the guidance and BMPs when permitting and authorizing projects under their respective jurisdictions. The guidance and BMPs are suggestions, not requirements, for project developers and/or public agencies to help reduce permitting timelines and enhance and maximize environmental protections. While the guidance and BMPs are specific to renewable energy projects in the California deserts, they may be applicable in other areas of California and states where similar resource issues occur. For projects that involve resources not addressed in this manual, project proponents should contact the appropriate regulatory and resource agencies in their respective areas or states for guidance.

Adjustments to the voluntary pre-application filing guidance and post-application BMPs may be appropriate to accommodate unique, site specific conditions in the desert region, proposed project technologies, and project development and permitting schedules. The manual's recommendations are adaptable to address site and project specifics such as: frequency and type of wildlife use, terrain, location relative to other land uses, availability of scientifically accepted data, project design, and expected timeframes for preparation and filing/acceptance of applications by lead agencies. The guidance is intended to apply to project development related applications, rather than to applications for pre-project resource and facility location assessments.

As appropriate, implementing the activities and practices listed in this manual will support efforts to comply with the National Environmental Policy Act (NEPA), California Environmental Quality Act (CEQA) and other federal, state, and local environmental, energy development and wildlife laws. Following the manual's suggestions will assist and speed up the issuance of required permits for a project and improve the efficiency of the regulatory process.

The Desert Region

The DRECP planning area encompasses the California Mojave and Colorado Desert ecological regions (**Figure 1**). The western boundary was located slightly west of the desert to completely incorporate several Competitive Renewable Energy Zones identified in the Renewable Energy Transmission Initiative. The area includes all or a portion of the following counties: Kern, Los Angeles, San Bernardino, Inyo, Riverside, Imperial, and San Diego.

Figure 1: Desert Region Boundary



Source: Renewable Energy Action Team, 2010

The deserts are vast but not vacant. Federal agencies (mainly BLM, National Park Service [NPS], and the Department of Defense [DOD]), California Department of Parks and Recreation, DFG, private land owners, and local governments manage the lands. These entities oversee national, state and local parks and preserves, monuments, wilderness, conservation and trail areas, military bases, cities, counties, and special districts. The dry landscapes are highlighted by dramatic geologic features--encompassing peaks, cliffs, canyons, dry washes, sand dunes, and large playas (basins). Common habitats and landscape features are creosote bush scrub, desert saltbush, Joshua tree scrub, desert wash, alkali scrub, and juniper-pinyon woodlands. Although limited, springs, seeps, perennial streams, and rivers are vital wet habitats supporting wildlife diversity.

The deserts are home to extraordinary plants and wildlife. The Joshua tree, barrel and prickly pear cacti, and pinyon pine trees highlight the desert landscape. Prairie falcons, golden eagles, burrowing owls, desert tortoises, rosy boas, desert horned lizards, collared and leopard lizards, Mohave ground squirrels, kangaroo rats, bobcats, kit foxes, mountain lions, and bighorn sheep are found in the deserts. These species are often dependent on the specialized desert features for their survival.

Wildlife species are at risk and ecosystems are degraded by the cumulative impact of urban growth, off-highway vehicle activity (especially illegal activity), cattle and sheep grazing, overdrawn groundwater, and invasive, non-native plants. These activities and conditions have and are continuing to fragment the landscape, degrade wildlife habitat, and disrupt desert ecosystems. Public agencies, private organizations, and landowners are involved in wildlife conservation efforts. The deserts are also rich cultural resource areas, with legally protected prehistoric and historic sites, and sites which are being investigated by archeologists. The REAT agencies are working with other agencies, local communities, tribes, environmental organizations, and the renewable energy industry in authorizing sound renewable energy projects. The guidance and BMPs in this manual will assist these interests in addressing effects of such development on the resources described above.

Desert Renewable Energy Resources

Renewable energy resources constantly replenish themselves or are regarded as practically inexhaustible. In the desert region the renewable energy resources of interest include solar, wind, geothermal, and biomass.

Renewable energy projects addressed in this manual include 1) energy development technologies eligible for State of California RPS certification, 2) utility or large-scale energy generation, geothermal extraction, digester, biogas, and biofuel refinery (biorefinery) facility projects, and 3) the associated roads, construction laydown areas, pipelines, geothermal wells, steam lines, and transmission lines to the first point of interconnection with the electric transmission system.

Utility-scale renewable energy electrical generation projects include facilities that convert the energy source to electricity (power plant) and facilities that deliver the electricity to the

electrical transmission system. Power plants include the energy resource collection or storage facilities, electricity generators, and when applicable, facilities and equipment for cooling the generators. These facilities differ in design depending on the type of renewable energy resource proposed for use. **Appendix B: Desert Renewable Energy Facility Technologies** provides brief descriptions of the renewable energy technologies addressed in this manual.

Some solar and other types of renewable energy power plants are proposed in conjunction with fossil fuel (most likely natural gas) fired power plants. The guidance and BMPs in this manual address hybrid-fueled power plants. For the plants to be eligible for RPS certification, the fossil fueled portion of the plant cannot exceed two to five percent of all fuels used, as measured on an annual energy input basis. For multi-fuel facilities that exceed the fossil fuel mix thresholds, the Energy Commission may certify the renewable portion of the generation, only, as RPS eligible. For more information refer to the *Renewables Portfolio Standard Eligibility Commission Guidebook*, Third Edition (CEC-300-2007-006-ED3-CMF) or later versions of the Guidebook, found at <http://www.energy.ca.gov/renewables/documents/index.html#rps>.

Organization of the Manual

Chapter 2 summarizes general pre-application filing guidance to consider for timely processing of Energy Commission applications for certification (AFCs), BLM right-of-way (ROW) grants, environmental review under NEPA and CEQA, other federal, tribal, state, and local government permit/approval applications and environmental review for desert renewable energy facilities. Project developer and agency pre-application filing actions may be of utmost importance as they will dictate whether project applications can be processed in an accelerated manner. The pre-application process begins and sets the tone for 1) project developer, agency and stakeholder working relationships and 2) the subsequent phases of project development within which the parties will address issues and agree on impacts/appropriate mitigation, and/or project design changes.

For desert renewable energy facilities **Chapter 3** recommends pre-application filing guidance detail and BMPs for post-application project development phases. **Chapter 4** provides additional guidance detail and BMPs specific to solar, wind, geothermal, and biomass energy technologies. Reviewing and becoming familiar with the BMPs during the pre-application phase will likely provide guidance for a) determining which pre-application actions are most appropriate for a particular project and b) carrying out those actions. The chapters are followed by a reference section, glossary, and list of acronyms, appendices, and attachments.

The manual incorporates the draft *Interim Guidance for Desert Renewable Energy Project Development* released on September 30, 2009, as revised. The REAT agencies combined the guidance and BMPs into one document to respond to direction in the renewable energy MOUs. The documents call for BMPs and other interim guidelines to assist renewable energy developers with project siting and design to avoid or minimize environmental impacts. Providing the information in one document consolidates REAT permitting advice and recommendations and assists comparison between the pre-application filing guidance, BMPs,

detailed information, and biological survey protocols located in the appendices and attachments.

Public Review

Publication of this manual follows extensive public, stakeholder, and agency review during the months of October, November, and December 2009, and January, September, and October 2010. Around 150 individuals representing renewable energy industry, public agency, local government, community, tribal, environmental, and general public interests participated in discussion on the draft manual at an October 13, 2009 public workshop in Victorville, California. REAT also provided the first public written comment period that extended from October 5, 2009 to November 20, 2009. Written comments on the draft manual were received from more than 15 organizations representing the interests listed above.

Nine organizations commented on the revised draft manual published on December 30, 2009 and five comment letters from six organizations were received on the September 2010 version. REAT thanks the organizations and individuals and appreciates the thoughtful and constructive comments. Revisions to the manual reflect careful consideration of the comments and discussions by REAT agencies.

CHAPTER 2: Pre-Application Filing Guidance - Summarized

Pre-application filing guidance is recommended, generally, for prospective projects in the early design or conceptual stages and for which applications have not yet been accepted or deemed complete by agencies. The REAT expects that project applications filed and/or deemed complete by agencies will continue to proceed through the environmental review and permitting decision processes following schedules and policies identified by the lead agencies and required in laws and regulations. For projects with applications submitted to agencies, but not accepted as complete, or for which applications are in earlier stages of development, it is expected the same process would apply after filing or being deemed complete: permitting decisions will continue to adhere to regulatory time frames and the individual lead agency requirements and policies. For such projects, developers and agencies may benefit from the pre-application guidance. However, developers and agencies are advised to use discretion, balancing the added benefit of the guidance with timely permit application processing.

Ideally, for projects to be permitted expeditiously, consistent with the Executive and Secretarial Orders and RPS, renewable energy developers should address significant issues that are time consuming to resolve before filing BLM, Energy Commission, and other lead agency applications. The following strategic actions guide how to address major significant issues that usually arise when conducting environmental reviews. The actions are numbered to assist review and discussion. The numbering sequence does not indicate the relative priority or importance of any action. Addressing most or all, as appropriate, would lead to expedited agency reviews and decision-making. If the majority of the actions are not addressed it is likely that handling environmental review and decision-making issues would take additional time.

Strategic Actions

- 1) The renewable energy project is proposed to be located on land identified by the REAT and/or BLM as suitable for renewable energy development.
- 2) The project will use air-cooling technologies for thermal power plant cooling.
- 3) The appropriate biological resource surveys are completed during the appropriate season using the proper protocols.
- 4) A draft biological assessment (BA), draft application for Incidental Take Permits, and draft Lake or Streambed Alteration Agreement (LSAA) notification form, if applicable to the project, are as complete as possible and filed with applications to the appropriate lead agencies. The draft BA must include a complete draft project description, full description and assessment of project impacts and species affected, and project impact mitigation measures.

- 5) Cultural resource surveys required by lead agencies, and lead agency approved archaeological reports, tribal consultations, assessments, and project impact mitigation measures are completed following the proper protocols and standards.
- 6) BLM requirements and Resource Management Plans are addressed and incorporated in the project design, for projects located on BLM managed lands. Projects are consistent with guidance in the BLM programmatic wind and geothermal Environmental Impact Statements (EISs), and after publication, the BLM programmatic solar EIS.
- 7) Local agency requirements, including but not limited to local zoning, general plan policies, land use, water, hydrology, safety, aesthetics, noise, traffic, and height restrictions, are incorporated into the applications to lead agencies. The project is consistent with Williamson Act requirements, zoning ordinances, and general plan designations. If termination of a Williamson Act contract is required for locating a project on contracted lands, contract termination is in the final stages.
- 8) DOD and nearby military installation requirements are addressed and incorporated into a project's design, ensuring that the project will not conflict with military operations.
- 9) Interconnecting the proposed project to the existing electric transmission system is shown to not negatively impact electric transmission system reliability. A transmission system interconnection study (California Independent System Operator [California ISO] Phase I, for example) is reviewed and completed by the California ISO or other control area operator. Measures for eliminating unacceptable degradation to the transmission system reliability beyond the first point of interconnection are identified and agreed upon.
- 10) For projects requiring local air quality management district or air pollution control district permits, include the proposed project determination of compliance or authority to construct application with applications to lead agencies.

A developer's failure to address and resolve readily known and predictable issues associated with a project before applications are filed will likely require additional permitting agency application processing time. Project developers should propose appropriate project design features and mitigation as part of an AFC to the Energy Commission, a ROW application to BLM, and/or an application with another appropriate lead agency (such as the U.S. Environmental Protection Agency [USEPA], California State Lands Commission [SLC], or local government). If items applicable to a project are not completed or the project is changed or modified after applications are filed, past experience indicates that significant application processing delays are likely and would hinder the ability of the BLM, Energy Commission, FWS, DFG, and possibly other agencies to process permits in a timely manner. Thus, early identification of impacts and options for addressing the impacts, and continuous coordination with appropriate regulatory agencies is advised to reduce permitting/approval time frames.

Initiating Permitting Processes

Early coordination with and responsiveness to the appropriate permitting agencies and stakeholders during project development can significantly reduce permitting/decision-making time frames. Initiation of a desert renewable energy project regulatory process begins by identifying the agencies that would or could have regulatory authority over a project and meeting with tribal, federal, state, and local agency staff that regulate activities affecting environmental, community, and military resources before submitting permit applications to the agencies. Meetings are generally most productive if the project description and scope are defined well enough to address the following:

- Project location and design options.
- Electrical grid interconnection location options.
- Permits and approvals needed for proposed renewable energy project construction and operation.
- Agency decision-making history of similar projects or important precedents.
- Identification of major stakeholder groups.
- Types of issues likely to be raised by agencies and stakeholders, including major project environmental, recreational, cultural/Native American, public health and safety, and electrical transmission system effects.
- Methods/processes to encourage agency coordination and joint or concurrent project review (such as combining the NEPA/CEQA environmental review documents and processes).
- Timing of permit applications and scheduling environmental review and decision-making processes.
- Approaches for aligning agency processes and avoiding duplicative or conflicting agency actions, including tools to improve agency communication, such as use of joint-agency pre-application meetings and adherence to agreed upon permitting schedules and milestones.

Agencies are encouraged to increase coordination, communication, and cooperation to improve on aligning their processes and avoid unnecessary duplication and conflicts. Working within agreed upon permitting schedules will help avoid undue delays. Necessary and anticipated delays should be communicated quickly to project developers and other agencies.

Although the following guidance suggests when to initiate meetings, the REAT recommends discussions with federal, state, and local regulatory agencies be ongoing to provide project design and agency procedure updates, reach agreement on studies/surveys needed, and maintain a realistic, coordinated permitting schedule. Project developers are advised to

consider the strategic actions and refer to **Chapters 3 and 4** for detailed recommendations on addressing environmental resource-related issues that typically arise during agency permit application review for renewable energy project proposed construction and operation. The following list identifies agencies and organizations, and the respective lead times for early consultations before providing applications to lead agencies.

- 1) Identify the appropriate proposed project NEPA/CEQA lead agencies. For example, the Energy Commission, BLM, SLC, or a local government may be the lead agency or agencies depending on the renewable energy project size, location, and technology.
- 2) Consult with the applicable NEPA/CEQA lead agencies on the applicable laws and regulations, and appropriate guidelines used by those agencies for conducting their environmental reviews. Discuss proposed project location and technology alternatives.
- 3) Initiate meetings with the NPS, Pacific West Region and/or California Department of Parks and Recreation, or other public park managers, as appropriate, if prospective project locations are within 10 miles of a national, state, or local public park or have the potential to impact public park resources and uses. In remote areas public park managers may be concerned about facility lighting impacts on night skies. Consult the **Chapter 3** visual resources sections for more detail. Managers may also advise project developers on recreational user groups likely to be interested in proposed projects. Such groups could include hikers, hunters, photographers, and off-road vehicle users. Contact groups as recommended later in this section in 16).
- 4) Initiate discussions with the transmission-owning utility with which the proposed project would interconnect at least 24 months prior to filing applications with lead agencies.

While utilities cannot disclose non-public transmission information to third parties, discussions can identify pertinent publically available interconnect information and required generator interconnect procedures that dictate discussion schedules and study content for large and small generator interconnection requests. Small generators are classified by the California ISO as those power plants with capacities of 20 megawatts or less.

- 5) Large generators: initiate discussions with the California ISO or other applicable transmission control agency at least 18 months before filing an application with the Energy Commission, BLM, or other lead agencies. Small generators: initiate discussions at least 12 months before filing applications with lead agencies.

It is recommended discussions address electric transmission interconnection study requirements and study assessment and approval procedures. Studies generally include identification of the transmission impacts beyond the first point of interconnection and acceptable measures to mitigate/alleviate system impacts. See **Chapter 3 Electricity Transmission Guidance** for more interconnection study content and procedures information.

- 6) Initiate prefilings meetings with the Energy Commission at least 12 months before filing an AFC. The Energy Commission has exclusive power to certify thermal electric generating power plants 50 megawatts or larger in size and related facilities within California. **Appendix A** provides more detail on the Energy Commission's role and responsibilities.
- 7) Initiate meetings with BLM at least 12 months before filing an application for ROW. ROWs are for construction and operation of facilities such as renewable energy power plants and biorefineries. BLM also issues geothermal energy production leases (including drilling of the wells) and manages subsurface activities on BLM managed lands, U.S. Forest Service administered lands, and military lands in the Mojave and Colorado Desert region. See **Appendix A** for more information on BLM's role.
- 8) Initiate prefilings meetings with other lead agencies, as appropriate, at least 12 months before application filing. For thermal electric generating power plants less than 50 megawatts in size, solar photovoltaic, and other non-thermal power plants (like wind farms) California lead agency status (under CEQA) would depend on project location and required state and/or local approvals. Refer to **Appendix A** for more information regarding lead agencies.
- 9) Initiate discussions with FWS and DFG at least 12 months before filing power plant applications with the Energy Commission and BLM; include BLM and Energy Commission in the discussions.

There are a number of special-status plant and wildlife species that exist in the desert and require consideration early in the site selection and evaluation process. It is important to discuss the project, potentially suitable areas for development or conservation, potentially affected plant and wildlife species and habitats, and possible mitigation and alternatives with agencies and local governments early in the project planning and development process. Such discussions may affect the project location and allow consideration of specific protocols that may require a year (or more) study before the start of the formal regulatory process. For certain species, such as Mohave ground squirrels, project developers may want to discuss stipulating that a species is present, based on site-specific conditions, and begin discussions on mitigation agreements.

Chapter 3, in the biological resources sections, provides information/advice on survey types/procedures and plans for biological resources, in general, and for specific species. **Attachment I: Biological Resource Survey and Assessment Guidance** provides survey protocols and other agency guidance for addressing specific state and federal wildlife, habitat, and plant conservation issues. **Attachment II: Management/Mitigation and Drainage Program Preparation Guidance** focuses on engineered drainages, burrowing owl mitigation, approaches for protecting bighorn sheep and Swainson's hawk resources, raven monitoring and control, revegetation, weed management, and special status plant avoidance/mitigation.

- 10) Initiate contact with applicable and appropriate local government agencies/companies, including water service entities, city and county departments of environmental health and/or protection, fire, transportation, and building and planning departments, 12 months in advance of filing applications with the lead agencies. Local governments may provide advice on scheduling meetings and discussions. Recommendations for addressing local government issues are offered throughout the manual. Refer to **Attachment III: Local Zoning Ordinance and General Plan Element Examples** for additional detail. In addition, the Energy Commission is updating its facility siting and permitting guide. A public review draft of the *Energy Aware Facility Siting and Permitting Guide* may be available at the end of 2010 or beginning of 2011. This guide will complement the manual by providing informative background information for local governments on power plant siting state and federal regulatory issues and approaches for addressing those issues within their jurisdictions.
- 11) Initiate meetings and consult with the applicable air quality management district or air pollution control district at least 12 months before filing an application to determine the District's requirements and application procedures. See the **Chapter 3** air quality sections for more information and recommendations.
- 12) If appropriate, meet with the Governor's Office of Planning and Research for addressing military land use compatibility, the State Clearinghouse, and/or CEQA Guidelines information. Consult **Chapter 3 Land Use/Agriculture Guidance** for more information on suggested approaches for addressing related issues.
- 13) Initiate meetings with the DOD and/or the appropriate or nearby military installation at least 12 months in advance of filing lead agency applications.

Include a letter from the DOD with the applications stating the military requirements have been addressed and incorporated into a project's design. **Chapter 3**, in the land use, safety, health, and nuisances, and traffic and transportation sections, provides further guidance on addressing potential issues involving DOD.
- 14) Initiate discussions with the U.S. Army Corps of Engineers (ACOE) at least 12 months in advance of filing applications with lead agencies to determine permitting jurisdiction and requirements.
- 15) Initiate meetings with the State Office of Historic Preservation (SHPO) at least 12 months before filing an application to initiate consultation on potential cultural resources issues. See **Chapter 3** sections on cultural and paleontological resources and **Attachment IV: Native American Heritage Commission Guidance** for further advice.
- 16) Meet with interested community, recreational, and environmental groups six to twelve months before filing applications with the appropriate lead agencies to involve the community leaders during early stages of project planning and development and inform them of the project and its potential benefits and impacts. Obtain stakeholder

input and begin identifying issues. This will be an ongoing process over time and is likely to result in a series of meetings. Activities to consider include:

- a) Consulting the community on the energy facility location to incorporate community values into design, as feasible and appropriate.
- b) Conducting public meeting educational presentations that include facility design and operation information and how projects can fit in with the community.
- c) Making commitments to hire community workers for construction and operation personnel.
- d) Including community project financial assistance into the project's business plan to help gain community support.

When developing applications for lead agencies, list the organizations and groups consulted, summarize their comments and concerns, and describe what has been done to address these concerns. Refer to **Chapter 3** sections on environmental justice for more information concerning public outreach. **Attachment V: Environmental Stakeholders: Renewable Siting Criteria: California Desert Conservation Area** provides information from a broad cross-section of the environmental community.

- 17) Initiate meetings and consult with the applicable regional water quality control board (RWQCB), State Water Resources Control Board (SWRCB) and/or the California Department of Public Health at least six months before filing applications to determine which project activities would be regulated and require permits from the regional or state water board, or department. Refer to the **Chapter 3** sections on soils, drainage, erosion, storm water, and flooding, and water supply and quality for more information.
- 18) Consult or initiate meetings with the Federal Emergency Management Agency (FEMA) if the project would likely modify the floodplain and determine if floodplain map revisions would be likely. Schedule meetings six months before providing applications to lead agencies. **Chapter 3** in **Soils, Drainage, Erosion, Stormwater, Flooding Guidance** provides recommended flood hazard planning activity information.
- 19) Initiate **meetings** with appropriate Native American tribes six months in advance of providing applications to lead agencies; refer to **Appendix IV: Native American Heritage Commission Guidance**.

Chapter 3, in addition to containing the sections referred to above, includes sections addressing potential noise and vibration issues. **Appendix C** provides a list of federal, state, and local information resources and Internet links; including REAT and other agency website addresses.

CHAPTER 3: General Pre-Application Filing Guidance & Best Management Practices

This chapter recommends pre-application filing guidance and BMPs for the desert renewable energy projects addressed in Executive Order S-14-08 and Secretarial Order 3285, in general. The chapter addresses technical issues ranging from air quality to water resources, including electricity transmission. Following this chapter are guidance and BMPs specific to individual renewable energy technologies: solar, wind, geothermal, and biomass. The technology-specific guidance and BMPs are to be considered together with the general guidance and BMPs found in this chapter. The guidance and BMPs are numbered to assist review and discussion; the numbering sequence does not indicate the priority or importance of any particular activity.

Guidance is offered for project developer and regulatory agency consideration when developing a prospective project, and preparing and reviewing an application. The suggested measures and activities do not supplant the Energy Commission's data adequacy filing requirements, the filing requirements of the BLM and other lead agencies, and requirements to initiate state and federal Endangered Species Act consultation with FWS and DFG. Project developers are advised to conduct, as appropriate, pre-application filing activities to address environmental resource related issues that generally arise during permit application agency review for proposed renewable energy project construction and operation. It is likely that all guidance measures listed below may not be applicable to a particular facility. The proposed facility design, technology, and location, in addition to applicable agencies, their requirements, and the schedule for providing applications to agencies, will determine the appropriate activities for a particular project.

BMPs are recommended practices (or combination of practices) determined to provide the most effective, environmentally sound, and economically feasible means of managing a project or facility and addressing the impacts. The BMPs in this document recommend the best set of practices for carrying out renewable energy projects in the desert region and minimizing natural, cultural, and human resource direct, indirect, and cumulative impacts. The recommendations and protocols discussed in these BMPs are suggestions for permitting agencies and developers to use at their discretion and can be used as a resource by other parties involved in the permitting process. The BMPs are recommended in the spirit of informing project developers of the typical practices that agencies expect and require in permits or other regulatory approval documents. The BMPs address the post-application permitting/pre-construction, construction, operation, repowering/retrofitting, and decommissioning development phases.

BMPs are too general to be project specific mitigation measures. The specific measures will be developed during individual project regulatory processes. Additionally, the BMPs list should not be considered final because additional BMPs may be identified to avoid and/or minimize impacts based on a proposed project's design, technology and site-specific characteristics.

Air Quality Guidance

- 1) Identify the applicable air quality management district for a project and follow the district's requirements and application procedures. A district's requirements may be different than the following guidance, depending on project details.
- 2) Determine (for criteria air pollutants) if the facility site is within a federal and/or state nonattainment ambient air quality standard area.
- 3) For projects to be located on federal lands or that would require a federal permit approval, evaluate General Conformity requirements. These typically are required if a proposed project is located in a federal nonattainment area and exceeds applicable emissions rate thresholds. A General Conformity evaluation and determination can take a year or more. The following USEPA and BLM websites provide more information on the "General Conformity" rule: <http://www.epa.gov/air/genconform/>, <http://www.blm.gov/nstc/air/index.html>.
- 4) Gather ambient air quality data early in power plant design, and the exploration and planning phases of geothermal well field design. Use standard and well established procedures for assessing air quality impacts. Gather representative local air quality agency approved meteorological data or establish a meteorological station (to collect at least one year of data) per regulatory agency surface meteorological data gathering requirements and methods.
- 5) Document background or baseline air quality conditions using available ambient air quality monitoring data from appropriate monitoring sites.
- 6) Document local topography, nearby structures, and physical parameters of emission sources.
- 7) If cooling towers are proposed, use appropriate lead and/or air quality regulatory agency staff recommended computer model(s) to calculate cooling tower plume dimensions for the representative ambient meteorological conditions and the project's cooling tower design characteristics.
- 8) Use air dispersion models (for example, AERMOD or SCREEN) to predict atmospheric impacts from emissions sources and fugitive dust. Run models using on-site or representative meteorological data representing at least one year of data. Use models to assess, and if necessary, reduce predicted impacts to sensitive receptors (for example, minor changes to stack dimensions, orientation, discharge point locations, and alternative well pad and power plant sites). Publish results in tables that compare results with regulatory thresholds.
- 9) Obtain, if possible, emissions inventory data from existing facilities with similar technology to the proposed project.
- 10) Include in project designs locations of source-testing sampling monitors.

- 11) Consider prevailing wind directions and the nearest sensitive receptors when planning the power plant facility configuration and cooling tower location.
- 12) For criteria pollutants emissions where local air district rules require emission offsets, provide a detailed list of the offsets/mitigation that could be purchased/secured to offset/mitigate the emissions, per district requirements.
- 13) Include with applications to lead agencies the proposed project application for a local air quality management district determination of compliance or authority to construct. Provide copies of the draft and final determination of compliance to appropriate lead agencies, when they are available.
- 14) For new emission sources to be located on federal land, 40 CFR Ch.1 Subpart B states that “[n]o department agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit or approve any activity that does not conform to an applicable implementation plan.” Include new or proposed source direct and indirect emissions to determine if a project general conformity analysis will be required. Provide a recommended approach to show conformity per methods allowed in 40 CFR Subpart 93.158.
- 15) Prepare an estimate of proposed project construction and operation sources and amounts of greenhouse gases (GHG). Include related calculations, employee trip, and maintenance activity transportation requirements, and identify measures to reduce or mitigate greenhouse gas emissions.

Air Quality BMPs

- 1) Before construction mobilization apply for, secure, and comply with appropriate air quality permits for project construction and operations from the local air quality management district and USEPA, if applicable. Project developers are advised that the appropriate air quality permits may be valid and remain in force for the life of the project.
- 2) Use fuels that meet California standards for motor vehicles or other uses as appropriate.
- 3) For combustion emission sources, use best available emission controls.
- 4) Prepare and comply with a dust abatement plan that addresses fugitive dust emissions during project construction and operation, in cooperation with the local air quality management district. Include provisions for monitoring fugitive dust in the abatement plan. Consider incorporating the following practices in the plan:
 - a) Control dust along main access roads through the facility to the power block by either paving, using soil binders or methods that provide a level of control similar to paving. Alternatives include crushed rock (gravel or similar material with fines removed) as the top layer. Complete road construction before beginning

construction in the main power block area. Similarly treat operations materials (such as chemicals and replacement parts) and delivery areas before taking initial deliveries.

- b) Stabilize unpaved construction roads and unpaved operational site roads (as they are being constructed) with a non-toxic soil stabilizer or soil weighting agent that can be determined to be as efficient or more efficient for fugitive dust control as CARB approved soil stabilizers, will not result in loss of vegetation, or increase other environmental impacts. During grading use water, as necessary, on disturbed areas in construction sites to control visible plumes. Stabilize disturbed soils (after active construction activities are completed) with a non-toxic soil stabilizer, soil weighting agent, or other approved soil stabilizing method. Reduce or eliminate the frequency of watering during periods of precipitation.
- c) Vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions. If unpaved roads are not stabilized, ensure that vehicles maintain speeds less than 11 miles per hour on unpaved areas within construction sites.
- d) Post visible speed limit signs at construction site entrances.
- e) Inspect and wash construction equipment vehicle tires, as necessary, so they are free of dirt before entering paved roadways.
- f) Provide gravel ramps of at least 20 feet in length at tire washing/cleaning stations.
- g) Gravel construction site unpaved exits, or use effective alternatives to treat and prevent track-out to public roadways.
- h) Ensure construction vehicles enter construction sites through treated entrance roadways, unless an alternative route has been approved by appropriate lead agencies.
- i) Use sandbags or equivalent effective measures to prevent run-off to roadways in construction areas adjacent to paved roadways. Ensure consistency with the project's Storm Water Pollution Prevention Plan (SWPPP), if such a plan is required for the project (see **Soils, Drainage, Erosion, Storm Water, Flooding Guidance** and **BMPs** sections later in this chapter).
- j) Sweep the first 500 feet of paved roads exiting construction sites, other unpaved roads en route from the construction site, or construction staging areas at least twice daily (or less during periods of precipitation) on days when construction occurs, to prevent dirt and debris accumulation. Sweep when dirt or runoff from construction site activities is visible on public paved roadways.
- k) Cover or treat with appropriate dust suppressant compounds soil storage piles and disturbed areas that remain inactive for longer than 10 days.

- l) Provide vehicles (used to transport solid bulk material on public roadways and that have potential to cause visible emissions) with covers. Alternatively, sufficiently wet and load materials onto the trucks in a manner to provide at least one foot of freeboard.
 - m) Use wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) where soils are disturbed in construction, access and maintenance routes, and materials stock pile areas. Keep related windbreaks place until the soil is stabilized or permanently covered with vegetation.
- 5) Use construction diesel engines with a rating of 50 hp or higher that meet, at a minimum, the Tier 3 California Emission Standards for Off-Road Compression-Ignition Engines, as specified in California Code of Regulations, Title 13, section 2423(b)(1), unless such engines are not available. If a Tier 3 engine is not available for off-road equipment larger than 100 hp, use a Tier 2 engine, or an engine equipped with retrofit controls to reduce exhaust emissions of nitrogen oxides (NO_x) and diesel particulate matter (DPM) to no more than Tier 2 levels. Regulatory agencies may determine that use of such devices is not practical when:
- a) There is no available retrofit control device verified by either CARB or USEPA to control engines in question to Tier 2 equivalent emission levels and the retrofitted or Tier 1 engines use the highest level of available control technology.
 - b) The construction equipment is intended to be on site for 5 days or less.
 - c) It can be demonstrated there is a good faith effort to comply with the recommendation and that compliance is not practical.
- 6) Consider using electric vehicles, biodiesel, or alternative fuels during construction and operation phases to reduce the project's criteria and GHG pollutant emissions.

Biological Resources Guidance

There are a number of existing desert special-status plant and wildlife resources that require consideration early in the site selection and evaluation process. Special status resources are legally protected under the Endangered Species Act (ESA), California Endangered Species Act (CESA), or other regulations, and are species that are considered sufficiently rare by the scientific community to qualify for the listings. **Appendix C Biological Resources** provides federal and California agency website addresses for obtaining information on endangered and other special status species and agency requirements. **Appendix A** describes the primary fish and wildlife agency (FWS, DFG) roles and authorities.

It is important to discuss the prospective project and potentially affected plant and wildlife species and habitats with agencies and local governments early in the project planning and development process (see for example, **Initiating Permitting Processes** in **Chapter 2**). Such

discussions may affect the project location and allow consideration of specific protocols that may require a year (or more) study before the start of the formal regulatory process.

- 1) Meet with FWS, DFG, and the appropriate lead agencies to identify potential issues, species that could be impacted (including special-status species and unique plant assemblages that could occur in the project area¹), designated critical habitat, impact avoidance options, survey protocols, mitigation measures, and expectations, wildlife translocation, and the contents of a draft BA, ITP application, and LSAA notification form, as applicable.

Attachment I: Biological Resource Survey and Assessment Guidance and **Attachment II: Management/Mitigation and Drainage Program Preparation Guidance** include Energy Commission, DFG, BLM, and FWS recommended wildlife and plant field survey guidance for renewable energy projects addressed in this document. Contact FWS and DFG to determine if new or revised protocols exist. Project developers are advised that multiple surveys may be requested if initial surveys are incomplete or inadequate. Regarding listed species impact mitigation, project developers are encouraged to discuss with FWS and DFG approaches for developing a comprehensive conservation strategy, which will likely include land acquisition and management alternatives.

- 2) Meet with applicable local governments to determine whether the site contains locally protected trees and shrubs.
- 3) Design and site the project, in consultation with permitting agencies, to avoid or minimize impacts to sensitive and unique habitats and wildlife species. Consider locating energy generation facilities, roads, transmission lines, and ancillary facilities in the least environmentally sensitive areas (such as away from riparian habitats, streams, wetlands, vernal pools, drainages, sand dunes, critical wildlife habitats, wildlife conservation, management, other protected areas, or unique plant assemblages). As examples:
 - a) Design transmission line poles, access roads, pulling sites, storage, and parking areas to avoid special-status species or unique plant assemblages adjacent to linear facilities.
 - b) Locate and/or design facilities to minimize or mitigate wildlife movement disruptions.
 - c) Design facilities to discourage their use as bird perching, drinking, or nesting sites.

¹ In this context, project areas include those areas that could be directly and indirectly impacted by the project.

- d) Design facility lighting to prevent side casting of light toward wildlife habitat and skyward projection of light that may disorient night-migrating birds.
 - e) Avoid using or degrading high value or large intact habitat areas, such as areas identified as Joshua tree woodlands and/or in state wildlife action plans.
 - f) Avoid severing movement and connectivity corridors. Consider existing conservation investments such as protected areas and lands held in trust for conservation purposes.
 - g) Locate facilities so they do not disrupt sand transport processes nor remove some or all of a sand source that contributes to sand dune systems harboring listed or otherwise sensitive species. Avoid armoring nearby dune system sand sources.
 - h) Consider one or more alternative site configurations or locations when designing and siting projects and provide the alternatives analysis to FWS, DFG, and lead agencies.
- 4) Submit survey protocols to FWS, DFG, and appropriate lead agencies for review, comment, and approval. Refer to **Attachments I and II** for survey protocols and guidance. Also, to ensure the quality of the surveys, provide the names and qualifications of the surveyors to FWS, DFG, and the lead agencies for review/comment two weeks before initiating surveys.
 - 5) Complete biological resource surveys during the appropriate seasons consistent with agency approved survey protocols. Agencies may require multiple surveys during the spring and fall seasons. Follow-up surveys may be requested, based on rainfall, weather, and adequacy of initial surveys. Ensure the draft BA includes a complete description of the project, thorough discussion of the species and habitats, identification of the biological resource impacts, and recommended mitigation measures to avoid and address expected impacts. Provide a draft BA and approval letters in applications to the appropriate lead agencies.
 - 6) After completion of special status plant surveys (see **Native Plants, Attachment I** for detailed plant survey guidance), include a draft mitigation plan (as applicable) containing scientifically supportable recommendations on how special status plant species impacts would be addressed, in applications to appropriate lead agencies. Refer to *Preparing Special-Status Plant Avoidance/Mitigation Plans*, **Attachment II**.
 - 7) Meet requirements and conditions of existing Natural Community Conservation Plans/Habitat Conservation Plans if a project is to be located within an area covered by such conservation plans (such as the Riverside County Coachella Valley area).
 - 8) Complete wetlands delineations for waters of the state and U.S. Provide verification in applications to lead agencies that the wetlands delineations are acceptable to the appropriate state (DFG) and federal (ACOE) regulatory agencies. Providing the verification after submittal of such applications may cause permit processing delays.

- 9) Provide in applications to lead agencies, a draft plan for addressing impacts to hydrologic functions and biological resource values if the project proposes rerouting or using as a project water source creeks, washes, wetlands, or other naturally occurring waters. **Attachment II**, *Preparing Revegetation Plans to Address Vegetated State Waters Impacts* provides guidance.
- 10) In applications to appropriate lead agencies, provide copies of the ITP and LSAA draft application(s), if DFG has indicated one or both will be required.
- 11) Include, as appropriate, a draft common raven (*Corvus corax*) management plan for the project site in applications to appropriate lead agencies (refer to *Preparing Raven Monitoring and Control Plans (Draft)*, **Attachment II**²). Controlling common raven use of project sites assists in reducing adverse impacts on protected species, such as desert tortoises.

Develop the plan in coordination with the FWS, DFG, and the appropriate lead agencies. Provide verification that fish and wildlife management agency offsite raven management consultation and concurrence occurred during development of the draft raven management plan. The FWS will likely require that the project-specific plan be consistent with its most current approved guidelines, including use of adaptive management strategies. Consider approaches to carry out the plan for the life of the project. Include construction and operation management strategies that avoid creating favorable feeding, watering, nesting, roosting, and perching conditions for common ravens, remove common raven nests from project structures on a regular basis, and control and limit common raven abundance.

Ensure the plan's goal states that the project does not attract common ravens. Specify in the plan:

- a) Passive design strategies (including the use of repellant devices to discourage nesting, perching, and roosting on project facilities, including transmission poles and towers).
- b) A refuse management system.
- c) A monitoring program.
- d) Reporting requirements.

²The referenced draft guidance was prepared by the REAT agencies, who expect to update the document. Project developers are advised to consult with the appropriate agencies before preparing a plan.

- e) Adaptive management options that would be applied if needed, including the removal of common raven nests.
- 11) Avoid use of evaporation ponds for water management (other than storm water runoff), where the water would be considered toxic to birds and other wildlife. If wastewater disposal evaporation ponds are anticipated, include a complete description of and justification for the ponds in applications to lead agencies. Include in the description the acreage, depth, slope of the pond sides, and capacity of each pond. Also describe how often water is likely to stand in the pond(s) and proposed pond design features for discouraging bird and other wildlife use. Identify the projected quality and toxicity of the prospective pond waters and potential harm or impact to wildlife. Describe prospective or possible threats and potential strategies for addressing the threats if it is determined the ponds will pose a threat to wildlife.
 - 12) If evaporation ponds are included in the project design, discuss and analyze environmental and economic alternatives, including using modern and cost effective zero liquid discharge (ZLD) technologies.
 - 13) Avoid siting projects in areas identified for desert tortoise recovery or conservation according to the *Draft Revised Recovery Plan for the Mojave Population of the Desert Tortoise (Gopherus agassizii)* (U.S. Fish and Wildlife Service 2008) (such as designated critical habitat, Areas of Critical Environmental Concern, Desert Wildlife Management Areas, NPS lands, and other areas or easements managed for desert tortoises). Be aware that siting proposed projects in conservation areas providing habitat linkages and wildlife corridors, including those areas designated as Wildlife Habitat Management Areas under BLM land use plans, may raise agency concerns and calls for habitat protection or mitigation. Because the range of the federally and state-listed desert tortoise largely coincides with the areas covered by the Manual, many proposed projects are likely to impact this species and surveys may appropriate. Refer to http://www.fws.gov/ventura/speciesinfo/protocols_guidelines/ for fws survey protocols.
 - 14) Consult with FWS and DFG to determine the need for and/or feasibility of conducting desert tortoise translocation (changing location or position) to minimize the taking of the tortoises, if they are observed within the proposed project area. See http://www.fws.gov/ventura/speciesinfo/protocols_guidelines/ for federal translocation plan guidance. Translocation plan development and implementation may require, but not be limited to: additional surveys of potential recipient sites; translocated and resident tortoise disease testing and health assessments; monitoring protocols; and consideration of climatic conditions at the time of translocation. Due to the potential magnitude of proposed renewable energy project impacts on desert tortoises, FWS and DFG must evaluate translocation efforts on a project-by-project basis in the context of cumulative effects.

- 15) If wildlife species are to be translocated before project construction, develop a draft translocation plan and provide the draft plan in applications to appropriate lead agencies. The draft plan must be developed in consultation with DFG and FWS. Request an outline or copy of a previously approved plan from FWS to use as an example.
- 16) When deemed appropriate by the fish and wildlife agencies, provide a draft habitat compensation plan that describes the acquisition schedule relative to expected project groundbreaking, endowment funding strategy, and amount to ensure adequate funding (in perpetuity) for compensation lands management. Identify the location, suggested amount of compensation habitat, and rationale for the suggested habitat compensation location(s).
- 17) Include a complete description of the proposed funding mechanism to address facility closure and habitat restoration in applications to appropriate lead agencies. Guarantee in the funding strategy that sufficient financial resources will be available to cover project removal costs and successful project site habitat restoration.

Biological Resources BMPs

During environmental review and regulatory decision-making processes, lead agencies will consult with FWS and DFG consistent with the federal and state Endangered Species Acts, NEPA, and CEQA. The consultations and determinations of effects on protected species will be based on the BAs prepared for projects and documents prepared for project ITPs and LSAAs. Consultation activities may highlight approaches for minimizing or eliminating impacts on protected species and mitigation that may or may not be addressed in the BAs or the following BMPs. Guidance for preparing consultation initiation packages and addressing common flaws in developing effect determinations is provided in **Attachment I, General**.

Recently enacted California legislation (SBX8 34-Padilla) allows eligible solar project developers to pay impact mitigation in-lieu fees for plant/wildlife species and related habitat impacts expected to be caused by the projects. The REAT agencies recently signed a MOU with the National Fish and Wildlife Foundation to allow a) desert renewable energy project developers to pay for project-specific mitigation and b) pooling funds in the newly created REAT Account for land purchases, conservation research, and improving biological resource management. The in-lieu fees and Account are similar in that renewable energy project developers pay into accounts and a third party carries out the mitigation measures. Project developers are advised to contact appropriate lead agencies and/or FWS and DFG to determine if the options provided by the new law and MOA benefit their projects. See **Appendix A** for more information.

General to any species of interest

- 1) Prepare a project-specific mitigation and monitoring plan in cooperation with and that meets the approval of permitting agencies. Carry out the plan during all phases of the project and, in general, identify appropriate mitigation levels to compensate for

significant direct, indirect, and cumulative impacts, including habitat, special status plant, and wildlife species losses. Address at a minimum:

- a) Biological resource mitigation, monitoring and compliance measures required by federal, state, and local applicable permitting agencies.
 - b) Documentation (based on surveys) of sensitive plant and wildlife expected to be affected by all phases of the project (project construction, operation, abandonment, and decommissioning). Agencies may request additional surveying, based on the documentation or past experience working with the resources. Include measures to avoid or minimize impacts to species and habitat.
 - c) A detailed description of measures to minimize or mitigate permanent and temporary disturbances from construction activities.
 - d) All locations on a map, at an approved scale, of sensitive plant and wildlife areas subject to disturbance and areas requiring temporary protection and avoidance during construction.
 - e) Aerial photographs or images, at an approved scale, of areas to be disturbed during project construction activities.
 - f) Duration for each type of monitoring and a description of monitoring methodologies and frequency.
 - g) Performance standards and criteria to be used to determine if/when proposed mitigation is or is not successful.
 - h) All standards and remedial measures to be implemented if performance standards and criteria are not met.
 - i) A closure/decommissioning or abandonment plan, including a description of funding mechanism(s). See 26) below for specific recommendations.
- 2) Use maps to show pre-permitting studies results and sensitive resources locations, facilities, roads, fences, and other infrastructure sites. Confer with appropriate agencies to determine appropriate map scales.
 - 3) Minimize, as much as possible, the area disturbed by pre-construction site monitoring, testing activities, and installations.
 - 4) Use construction and installation techniques that minimize new site disturbance, soil erosion, and removal of vegetation.
 - 5) Avoid or minimize site/project area disturbance to special status species and unique plant assemblages.
 - 6) Use existing roads and utility corridors as much as possible to minimize the number and length/size of new roads, laydown, and borrow areas.

- 7) In consultation with permitting agencies, avoid special status species or unique plant assemblages when installing and maintaining transmission line towers/poles, access roads, pulling sites, and storage and parking areas adjacent to linear facilities.
- 8) Install and maintain facility lighting to prevent up and side casting of light towards wildlife habitat.
- 9) Bury electrical collector lines to minimize surface disturbance (for example, along roads or other paths of surface disturbance). Overhead lines can be considered in cases where burying lines would result in disturbance of significant habitat, but must be balanced with the concern for creating additional bird perching opportunities.
- 10) Before beginning construction, delineate the boundaries of areas to be disturbed using temporary construction fencing and/or flagging, and confine disturbances, project vehicles, and equipment to the delineated project areas.
- 11) Ensure that vehicular traffic is confined to existing routes of travel to and from the project site, and prohibit, within project boundaries, cross country vehicle and equipment use outside of approved designated work areas.
- 12) If the need for using surfacing, road sealant, soil bonding, and stabilizing agents on non-paved surfaces is determined [see **Air Quality BMPs 5) b)**, for example] use agents that have been shown to be non-toxic to wildlife and plants.
- 13) If the application of water is needed to abate dust in construction areas and on dirt roads, use the least amount needed to meet safety and air quality standards and prevent the formation of puddles, which could attract wildlife to construction sites.
- 14) Minimize construction and operation related noise levels to minimize impacts to wildlife.
- 15) Use explosives only within agency approved specified times and at specified distances from sensitive wildlife and habitats.
- 16) Maintain vehicles and equipment in proper working condition to minimize fugitive emissions and accidental motor oil, antifreeze, hydraulic fluid, grease, other fluids, or hazardous materials spills. At the time of occurrence stop and clean up fuel or hazardous waste leaks, spills, or releases. Immediately repair equipment and site damages. Remove and dispose spill and related clean up materials at an approved offsite landfill and report spills to the permitting agencies. Store service construction equipment at designated areas only. REAT agencies advise that service/maintenance vehicles carry appropriate equipment and materials to isolate and remediate leaks or spills; and availability of an onsite spill containment kit for fueling, maintenance, and construction.
- 17) Dispose trash and food-related items in self-closing, sealable containers with lids that latch to prevent wind and wildlife from opening containers. Empty trash containers

daily and remove from the project site those associated with construction when construction is complete.

- 18) Prohibit workers or visitors, while on project property, from: feeding wildlife, bringing domestic pets to the project site, collecting native plants, or harassing wildlife.
- 19) Designate a qualified biologist (approved by FWS and DFG) responsible for overseeing compliance with biological resources BMPs during mobilization, ground disturbance, grading, construction, operation, and closure/decommissioning, or project abandonment, particularly in areas containing or known to have contained sensitive biological resources, such as special status species and unique plant assemblages. It is suggested that the qualified biologist be responsible for actions including, but not limited to, the following:
 - a) Clearly marking sensitive biological resource areas and inspecting the areas at appropriate intervals for meeting regulatory terms and conditions.
 - b) Inspecting, daily, active construction areas where wildlife may have become trapped (for example, trenches, bores, and other excavation sites that constitute wildlife pitfalls outside the permanently fenced area) before beginning construction. At the end of the day, conducting wildlife inspections of installed structures that would entrap or not allow escape during periods of construction inactivity. Periodically inspecting areas with high vehicle activity (such as parking lots) for wildlife in harm's way.
 - c) Overseeing cactus and yucca salvage operations.
 - d) Immediately recording and reporting hazardous spills immediately as directed in the project hazardous materials management plan.
 - e) Coordinating directly and regularly with permitting agency representatives regarding biological resources issues, including biological resource BMP implementation.
 - f) Maintaining written records regarding implementation of biological resource BMPs and providing a summary of these records periodically in a report to the appropriate agencies.
 - g) Notifying the project owner and appropriate agencies of non-compliance with biological resources BMPs.
- 20) Develop a project-specific worker environmental awareness program (WEAP) that meets the approval of the permitting agencies and would be carried out during all phases of the project (site mobilization, ground disturbance, grading, construction, operation, closure/decommissioning, or project abandonment, and restoration/reclamation activities). Identify in the WEAP biological resources and BMPs for minimizing impacts to resources. Provide interpretation for non-English

speaking workers, and provide the same instruction for new workers prior to their working onsite. Keep in project field construction office files the names of onsite personnel (for example, surveyors, construction engineers, employees, contractors, contractor's employees, subcontractors) who have participated in the education program. At a minimum, include the following in the program:

- a) Photos and habitat descriptions for special status species that may occur on the project site and information on their distribution, general behavior, and ecology.
 - b) Species sensitivity to human activities.
 - c) Legal protections afforded the species.
 - d) Project BMPs for protecting species.
 - e) State and federal law violation penalties.
 - f) Worker responsibilities for trash disposal and safe/ humane treatment of special status species found on the project site, associated reporting requirements, and specific required measures to prevent taking of threatened or endangered species.
 - g) Handout materials summarizing the contractual obligations and protective requirements specified in project permits and approvals.
 - h) Project site speed limit requirements and penalties.
- 21) Develop a permitting agency approved project-specific integrated weed management plan that would be carried out during all phases of the project. Refer to *Preparing Weed Management Plans*, **Attachment II** for a description of recommended plan elements. The following lists examples of measures to include in the plan and that prevent establishment, spread, and propagation of noxious weeds:
- a) Limit the size of vegetation and/or ground disturbance to the absolute minimum, and limit motorized ingress and egress to defined routes.
 - b) Store project vehicles onsite in designated areas to minimize the need for multiple washings of vehicles that re-enter the project site.
 - c) Maintain vehicle wash and inspection stations and closely monitor the types of materials brought onto the site.
 - d) Thoroughly clean the tires and undercarriage of vehicles entering or reentering the project site.
 - e) Reestablish native vegetation quickly on disturbed sites.
 - f) Monitor and quickly implement control measures to ensure early detection and eradication of weed invasions.

- g) Use certified weed-free straw, hay bales, or equivalent for sediment barrier installations.
 - h) Train employees and contractors to carry out the WEAP and on their role in ensuring the effectiveness of implementing the Plan.
- 22) Prepare a project specific restoration, revegetation, and reclamation plan that meets the approval of permitting agencies and would be carried out during all project phases. Address, at a minimum:
- a) Minimizing natural vegetation removal and considering cutting or mowing vegetation rather than total removal, whenever possible.
 - b) Salvage and relocation of cactus and yucca from the site before beginning construction.
 - c) Identification of protocols to be used for vegetation salvage.
 - d) Reclaiming areas of temporarily disturbed soil using certified weed free native vegetation and topsoil salvaged from excavations and construction activities.
 - e) Restoration and reclamation of temporarily disturbed areas, including pipelines, transmission lines, staging areas, and temporary construction-related roads as soon as possible after completion of construction activities. The actions are recommended to reduce the amount of habitat converted at any one time and promote recovery to natural habitats.
 - f) Specifying proper seasons and timing of restoration and reclamation activities to ensure success.

Attachment II, *Preparing Revegetation Plans to Address Vegetated State Waters Impacts* may be applicable to certain projects.

- 23) Prepare a facility vector (such as mosquitoes or rodents) control plan, as appropriate, that meets the permitting agency approval and would be implemented during all phases of the project.
- 24) As much as possible, re-use existing roads, substations, ancillary facilities, and disturbed areas in repower layouts.
- 25) For a repowering or retrofit project, remove and stabilize roads and facilities that are no longer needed; re-seed with native plants appropriate for the soil conditions and adjacent habitat. Derive plants from local seed sources where feasible. The term "local" in this context means seed sources with a genetic makeup that do not vary substantially from seeds or plants found at the disturbed location.
- 26) Prepare a project-specific closure/decommissioning or abandonment plan that meets permitting agency approval. Address the following topics, at a minimum:

- a) Removal of transmission conductors, power lines, and fencing when they are no longer used and useful.
- b) Removal of above-ground power plant site facilities and related facilities when they are no longer used or useful.
- c) If the site has been terraced or otherwise substantially altered from its natural contour, recontouring may be necessary.
- d) If the plan anticipates topsoil removal, address soil storage and vegetation. Restore soil profiles so that topsoils will establish and maintain preconstruction native plant communities as much as possible.
- e) Methods for restoring wildlife habitat and promoting the re-establishment of native plant and wildlife species.
- f) Methods for restoring vegetation cover, composition, and diversity to values commensurate with the natural ecological setting. It is recommended that the plan calls for use of local seed sources and identifies those sources, where possible.
- g) Revegetation of the project site and other disturbed areas using appropriate native seed mix.
- h) Criteria that would trigger plan implementation (for example, facility nonoperation for one year or more).
- i) A cost estimate to complete closure/decommissioning-related activities.
- j) A funding mechanism (such as bonds or other financial sureties) to ensure sufficient funds are available at the time the project is abandoned for revegetation, reclamation, and decommissioning.

Specific Species

The following sections pertain to individual plant, avian, mammal, and amphibian species.

Plants

Refer to **Native Plants, Attachment 1**, and *Preparing Special-Status Plant Avoidance/Mitigation Plans, Attachment II* for further detail.

- 1) Follow BLM and DFG guidance/requirements for mapping/surveying for succulents, including yucca and various cactus species. At a minimum, count barrel cacti, Joshua trees, Mojave yuccas, or old growth Sonoran Desert woodland trees, and photo-document BLM/DFG sensitive plants species found within the area that may be directly and indirectly impacted by the project.
- 2) Avoid, to the extent possible, areas of high succulent/yucca/cactus density.

- 3) Salvage and transplant succulents/yucca/cactus in the project area. Develop a succulents/yucca/ cactus salvage and transplantation plan for BLM/DFG, approval when appropriate.

Birds and Bats (not applicable to common raven [Corvus corax])

Recommended below are bird and bat BMPs applicable to the species and renewable energy projects, in general. **Abandoned/Old Mines, Attachment 1** provides survey protocols and mine closure considerations for projects proposed to be located on or near land that has old mines. Refer to **Attachment II, Swainson's Hawk Survey Protocols, Impact Avoidance, and Minimization Measures for Renewable Energy Projects in the Antelope Valley of Los Angeles and Kern Counties, California**. For wind projects, refer to **Appendix D: California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development**. Additional information is provided in **Chapter 4** of this manual.

- 1) Conduct pre-construction avian nest surveys in accordance with BLM, FWS, and DFG guidance, if construction activities are anticipated to occur from February 1 through August 31. Conduct surveys within potential nesting habitat in the proposed project site and within 500 feet of the site and linear facilities boundaries. Presence of larger bird species may require larger survey areas; check with the appropriate agencies for further information. Avoid vegetation removal or other ground disturbance activities from February 1 to August 31 to avoid impacts to native breeding/nesting birds. If work during the breeding/nesting season cannot be avoided, it is recommended a qualified biologist survey breeding/nesting habitat for related birds within and adjacent to the project site before construction or site preparation. Begin surveys no later than May 1 and conduct a minimum of three times spaced three to five days apart and ending no more than three days before onset of construction. Document the findings and provide to the appropriate agency(ies) for review and concurrence. Plan for beginning site preparation and construction after receiving the concurrence and if no breeding/nesting birds are observed. If breeding activities and/or active bird nests are located, fence breeding habitat/nest areas a minimum of 300 feet (500 feet for raptors) in all directions and do not disturb the area until the nest is inactive and the young have fledged, are no longer being fed by parents, and have left the area.
- 2) Establish non-disturbance buffer zones to protect raptor nests, bat roosts, areas of high bird or bat use, or special-status species habitat identified in pre-construction studies. Determine the extent of the buffer zone in consultation with the appropriate agencies. Be prepared to establish buffer zones and protection, mitigation, and monitoring plans for active nests detected during surveys.
- 3) Retain an avian-qualified biologist to monitor the nest until he/she determines that nestlings have fledged and dispersed. Generally prohibit activities that might, in the opinion of an avian-qualified biologist, disturb nesting activities within the buffer zone until such a determination is made.

- 4) Develop a bat and avian protection plan to protect bats and migratory birds, while improving conservation, safety, and reliability for utility customers. Consult guidance in the California Guidelines (**Appendix D**) and *Avian Protection Plan Guidelines* published by the Avian Power Line Interaction Committee (APLIC) and FWS (Avian Power Line Interaction Committee and U.S. Fish and Wildlife Service 2005)
<http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/APP/AVIAN%20PROTECTION%20PLAN%20FINAL%204%2019%2005.pdf>.
- 5) Install and maintain transmission lines and electrical components in accordance with the APLIC *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee 2006) to reduce the likelihood of electrocutions of raptors and other large birds.
- 6) Install and maintain transmission lines and electrical components in accordance with the APLIC *Mitigating Bird Collisions with Power Lines: The State of the Art in 1994* (Edison Electric Institute 2004) to reduce the likelihood of bird collisions.
- 7) Place low and medium voltage connecting power lines underground whenever possible. In certain circumstances, burial of the lines may be prohibitively expensive (for example in shallow bedrock areas) or may cause unacceptable impacts to wetland habitats and dependent species. Overhead lines may be acceptable:
 - a) if sited away from high bird crossing locations, such as between roosting and feeding areas or between lakes, rivers, and nesting areas; and/or
 - b) when the structures parallel tree lines or are otherwise screened so that collision risk is reduced.
- 9) Generally, do not construct permanent communication towers and permanent meteorological towers with guy wires. If guy wires are necessary for permanent or temporary towers, use bird flight diverters or high visibility marking devices. Develop and carry-out a monitoring plan to determine the diverters'/devices' effectiveness in reducing bird and bat mortality.
- 10) Install and maintain facility lighting to prevent upward and side casting of light towards wildlife habitat and propose use of motion sensors. If the Federal Aviation Administration (FAA) requires turbine or tower lighting to alert aircraft, minimize avian collision risks by using red or white strobe lights on the structures. The strobes should be on for as brief a period as possible and the time between strobe or flashes should be the longest possible. Synchronize strobes so that a strobe effect is achieved and towers are not constantly illuminated.
- 11) Use lights with sensors and switches to keep lights off when not required.
- 12) Minimize use of high-intensity lighting, steady-burning, or bright lights such as sodium vapor or spotlights.

- 13) If the use of open evaporation ponds is permitted for the project and especially if the water would be considered toxic to wildlife, design the ponds to discourage bird and other wildlife use.

Bald and Golden Eagles

- 1) Comply with the prohibitions against “take” under the Bald and Golden Eagle Protection Act, (16 U.S.C. 668 et seq.) (Eagle Act), which include activities that “disturb” eagles. “Disturb” means (according to the regulatory definition (72 FR 31131):

“To agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, injury to an eagle; a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”
- 2) Site specific surveys and monitoring of known or suspected golden eagle nesting and foraging habitat in areas where eagles occur (i.e. all of California) are recommended as a portion of actions necessary to provide background information related to eagle take permits. Surveys will be conducted using (at least) methods and qualified personnel as recommended by the FWS. Consult with the FWS for the most recent guidance regarding non-breeding season surveys for winter, migratory, and floating populations of eagles.
- 3) Where proposed projects may result in take of bald or golden eagles, consult with the FWS to determine the standards and requirements for the permit titled “Eagle Take – Necessary to Protect Interests in a Particular Locality.” Eagle take permits are performance based and will hinge on the merits of the application. The permit application form and related information are on the FWS website:
<http://www.fws.gov/migratorybirds/baldeagle.htm>. The final rule (Federal Register / Vol. 74, No. 175, September 11, 2009), Environmental Assessment (http://www.fws.gov/migratorybirds/CurrentBirdIssues/BaldEagle/FEA_EagleTakePermit_Final.pdf), implementation and protocol documents, and consultations with FWS will provide additional guidance.
- 4) Avoid, to the extent needed to comply with state and federal requirements, siting project facilities and infrastructure in a location or manner that would cause bald and golden eagle mortality, injury, and/or disturbance; i.e. locate facilities outside of eagle breeding home ranges as well as important breeding, wintering, and dispersal foraging areas, migration stopovers and corridors, and areas used by eagles for thermal or orographic lift.
- 5) Where applicable, incorporate actions to avoid eagle disturbance (refer to the FWS National Bald Eagle Management Guidelines, May 2007 and *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in*

Support of Golden Eagle Management and Permit Issuance, Attachment II). Consult with FWS for the most current guidance and measures to avoid eagle disturbance.

Burrowing Owl

- 1) Retain a qualified biologist to complete a preconstruction survey for burrowing owls in areas subject to disturbance from construction no less than 30 days before the start of initial ground disturbance activities. Design preconstruction surveys with four separate site visits conducted on different dates to maximize detection. If burrowing owls are present within 500 feet of the project site or linear facilities, confer with FWS and DFG staff for up-to-date guidance on surveys and mitigation programs. Refer to **Attachment II** for current survey protocol and mitigation recommendations from FWS and DFG.
- 2) If burrowing owl relocation is determined to be an appropriate conservation measure, develop and implement a burrowing owl mitigation and monitoring plan for DFG and other permitting agency approval. Outline the number of new burrows to be created, their locations, and how created burrows/individuals and compensation land would be protected for the life of the project.

Mammals, Amphibians, and Reptiles

American Badger

Retain a qualified biologist, approved by the DFG and other permitting agencies, to conduct preconstruction surveys for badger dens in the project area, including areas within 250 feet of project facilities, utility corridors, and access roads. If badger dens are found, classify each den as inactive, potentially active, or definitely active. Excavate inactive dens by hand and backfill to prevent reuse by badgers. Monitor potentially and definitely active dens for three consecutive nights using a tracking medium (such as diatomaceous earth or fire clay) at the entrance. If no tracks are observed in the tracking medium after three nights, excavate the den and backfill by hand. If tracks are observed, progressively block the den with natural materials (rocks, dirt, sticks, and vegetation piled in front of the entrance) for the next three to five nights to discourage continued use by the badger. Excavate the den and backfill by hand to ensure that no badgers are trapped inside. Ensure excavation and filling activities are performed by the qualified biologist and conducted outside of the breeding season to protect young badgers.

Desert Bighorn Sheep Likely to Occur in the California Desert Region

Retain a qualified biologist, approved by the DFG, FWS, and permitting agencies, to conduct preconstruction surveys for Peninsular and Mojave bighorn sheep (*Ovis canadensis nelsoni*). Due to low detection probabilities, use: data relative to historic ranges of bighorn sheep; known and potential wildlife corridors (such as, those identified in the BLM Mojave and Colorado deserts land use plans); point location data; and existing literature when evaluating potential projects impacts to the species. If California desert region bighorn sheep or their migration routes exist, are known or likely to occur on or in

the vicinity of the project site, and may be affected by project-related activities, consult with DFG, FWS, and other stakeholders, as appropriate, regarding avoidance, minimization, compensatory mitigation, or site abandonment. Refer to **Attachment II** *Protecting California Desert Region Bighorn Sheep* for information on the bighorn sheep species likely to be found in the California desert region and guidance that supplements consultations.

Mohave Ground Squirrel

- 1) Retain a Mohave ground squirrel qualified biologist, approved by DFG and other permitting agencies, to complete a Mojave ground squirrel pre-construction survey in areas subject to construction disturbance no less than 30 days before initial ground disturbance activities start. Refer to *Mohave Ground Squirrel Survey Guidelines*, **Attachment I**, and confer with DFG for up-to-date guidance on presuming presence of the animals, conducting surveys and survey protocols. The authorized biologist will likely have responsibility for ensuring compliance with agency required measures. The responsibilities will likely include conducting clearance surveys, handling Mohave ground squirrels, artificial burrow construction, and other procedures in accordance with DFG protocols.
- 2) If Mohave ground squirrels are found in project site burrows during project-related activities, ensure the qualified biologist will relocate the animal to a burrow at a DFG approved protected offsite location.

Desert Tortoise

Refer to http://www.fws.gov/ventura/speciesinfo/protocols_guidelines/ for survey and translocation guidance and http://www.fws.gov/nevada/desert_tortoise/dt_reports.html for federal recovery plan documents.

- 1) Conduct project activities when desert tortoises are inactive (typically November 1 to March 14) to minimize impacts to roaming individuals.
- 2) Retain a desert tortoise authorized biologist³ approved by DFG and FWS to oversee and be responsible for ensuring compliance with desert tortoise BMPs before initiation of and during ground-disturbing activities. Conduct clearance surveys, tortoise handling, artificial burrow construction, egg handling, and other procedures in accordance with the *Guidelines for Handling Desert Tortoise During Construction Projects* (Desert Tortoise Council 1994) or the most current FWS guidance.

³Please contact the FWS for a copy of the *Desert Tortoise Authorized Biologist Request Form*.

- 3) REAT agencies advise that the biologist be present on-site from March 15 through October 31 (active season) during ground-disturbing activities in areas outside the tortoise exclusion fencing. It is recommended that the biologist be on-call from November 1 to March 14 (inactive season) and checks such construction areas immediately before construction activities begin.
- 4) Before starting project ground-disturbing activities, avoid potential desert tortoise harm by incorporating desert tortoise exclusion fencing into permanent fencing surrounding the proposed facility. Construct tortoise exclusion fencing consistent with the *Desert Tortoise Exclusion Fence Specifications* (U.S. Fish and Wildlife Service 2005) or the most current guidance provided by FWS and DFG.
- 5) Install desert tortoise exclusion fencing around temporary project construction areas such as staging areas, storage yards, excavations, and linear facilities. Construct fences in late winter or early spring to minimize impacts to tortoises and accommodate subsequent tortoise surveys.
- 6) Within 24 hours before starting tortoise exclusion fence construction, it is recommended the biologist survey the fence alignment and clear desert tortoises from the area. Following construction of the tortoise exclusion fence, have the biologist conduct clearance surveys within the fenced area to ensure as many desert tortoises as possible have been removed from the site.
- 7) Install and regularly keep gates closed, except for the immediate passage of vehicles, to prevent desert tortoise passage into the project area.
- 8) Allow heavy equipment to enter the project site following the completion of project area desert tortoise clearance surveys by the authorized biologist. Monitoring initial clearing and grading activities by the biologist will help ensure that tortoises missed during the initial clearance survey are moved from harm's way.
- 9) Ensure that damage to the permanent or temporary fencing is immediately blocked to prevent tortoise access and permanently repaired within 72 hours between March 15 and October 31, and within 7 days between November 1 and March 14. Following installation, inspect permanent fencing quarterly and after major rains to ensure fences are intact and there is no ground clearance under the fence that would allow tortoises to pass.
- 10) Ensure the biologist inspects construction pipes, culverts, or similar structures: (a) with a diameter greater than 3 inches, (b) stored for one or more nights, (c) less than 8 inches aboveground, and (d) within desert tortoise habitat (such as, outside the permanently fenced area), before the materials are moved, buried, or capped. As an alternative, cap such materials before storing outside the fenced area or placing on pipe racks. Avoid inspection or capping if the materials are stored within the permanently fenced area after completing desert tortoise clearance surveys.

- 11) Ensure vehicular traffic does not exceed 25 miles per hour within the delineated project areas or on access roads in desert tortoise habitat. On unpaved roads suppress dust and protect air quality by observing a 10 mile per hour speed limit.
- 12) Inspect the ground under the vehicle for the presence of desert tortoise any time a vehicle or construction equipment is parked in desert tortoise habitat outside the permanently fenced area. If a desert tortoise is seen, it may move on its own. If it does not move within 15 minutes, the biologist may remove and relocate the animal to a safe location.
- 13) Design culverts to allow safe passage of tortoises.
- 14) If desert tortoises are observed within the project area, consult with CDFG, FWS, BLM,, or other appropriate permitting agency to determine the need for and/or feasibility of minimizing or mitigating project impacts through relocation or translocation. Development and implementation of a translocation plan may require, but not be limited to, additional surveys of potential recipient sites; disease testing and health assessments of translocated and resident tortoises; and consideration of climatic conditions at the time of translocation. Designate in plans a relocation site as close as possible to the disturbance site that provides suitable conditions for long-term survival of the relocated desert tortoise and outline a method for monitoring the relocated tortoise. Because the potential magnitude of proposed renewable energy project impacts to desert tortoise may be high, DFG and FWS must evaluate translocation efforts on a project by project basis in the context of cumulative effects.

Gila Monster

Retain a qualified biologist, approved by the DFG and other permitting agencies, to capture Gila monsters found on the project site. Maintain animals in a cool (less than 85 degrees F) environment until they can be released to a safe, suitable area beyond the construction impact zone. Coordination between the qualified biologist and DFG will likely be addressed by agencies when transport and relocation of Gila monsters encountered during project surveys, construction, or operation becomes an issue.

Cultural Resources Guidance

The following guidance is recommended to project developers acquiring cultural resources data for the appropriate lead agencies. It is expected that the data would be used for developing cultural resources inventories, conducting government-to-government consultations with Native Americans, evaluating impacts, and addressing adverse impacts under CEQA (Pub. Res. Code Sections 21083.2, 21084.1), NEPA (42 USC 4321 et seq), and Section 106 of the National Historic Preservation Act (16 USC 470f). For additional guidance refer to **Appendix C, Cultural Resources** and **Attachment IV: Native American Heritage Commission Guidance**. The supplemental information provides contacts for historical resources inventories and databases, and guidance for tribal consultation requirements and related federal and state statute advisories.

After submitting applications and required data, expect to respond to agencies' requests for more surveying and/or detailed information on resources, impacts, and/or requests for survey form and report revisions. For proposed projects on federal lands, federal land managers may require that cultural resources technical reports be provided only to the federal agency, to ensure information confidentiality, as required by federal law.

- 1) Retain the services of a cultural resources specialist with training and background that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 CFR Part 61).
- 2) Rely on the cultural resources specialist's expertise in choosing a site that avoids areas of exceptional historic value.
- 3) For a project on BLM lands that: includes remnants of a National Historic Trail and that is in the viewshed of a National Historic Trail's designated centerline; includes or is in the viewshed of a trail eligible for listing in the National Register of Historic Places (NRHP); or is in the viewshed of state or locally designated scenic routes, ensure the primary objective is to avoid or minimize potential proposed project associated visual impacts to the trail or route. Address identified unavoidable impacts with appropriate measures developed to reduce the impacts. Facility design/technology, its size, and location will determine the types of impacts and appropriate measures for addressing the impacts.
- 4) Consult with applicable lead agency cultural resources staff at least 12 months before filing an application. Obtain information on requirements for cultural resources background research, for the scope and methods of archaeological, geoarchaeological, traditional cultural property, and built-environment field surveys, and for Native American consultation. It is recommended the project developer's cultural resources specialist obtain information from the Native American Heritage Commission on the presence of Native American sacred sites in the project vicinity and a list of Native Americans who want to be contacted about proposed development in the project region.
- 5) Agencies may request that the project developer's cultural resources specialist coordinate consultation with appropriate Native American tribal governments (both those federally recognized and those not federally recognized) and interested Native American individuals on the Native American Heritage Commission list (see **Attachment IV**, for example). Coordination involves identification of cultural resources issues, preparation of notices, setting up meetings, and other related tasks. Issues include the presence of cultural properties, access rights, disruption to traditional cultural practices, and visual impacts to resources important to Native Americans.
- 6) Tribal consultation with federally recognized tribes is a government-to-government requirement under federal laws and must be accomplished by the lead federal agency.

In California, government to-government consultations may occur within state and local agency jurisdictions without the involvement of federal agencies. The Native American Heritage Commission recommends that a consultation be viewed as ongoing, rather than as a single event, started at the earliest point possible in the project planning process. While the project developer's cultural resources specialist may coordinate the consultation, the specialist may not speak on behalf of the agency. Ensure the project developer's cultural resources specialist completes an inventory of the archaeological sites and built-environment resources (45 years old or older) within and in the vicinity of the project's components' footprints. Conduct background research that would address, at a minimum:

- a) A records search for recorded resources, including resources previously determined eligible for or listed on the California Register of Historical Resources and the National Register of Historical Places, in areas affected by the proposed project.

Field surveys of those areas to identify previously unrecorded archaeological, built-environment resources, and known or potential traditional cultural properties. Determine the extent of the field surveys in consultation with the applicable lead agencies. For all surveys, but especially if the project area is 200 acres or larger and has not previously been farmed, grazed, logged, or developed, allow enough time for the archaeological survey to identify, thoroughly record, and evaluate the historical significance of a potentially large number of prehistoric and historical archaeological resources. Agencies may request additional surveys especially if initial surveys are incomplete or inadequate.

- 7) Following field surveys, ensure the cultural resources specialist records, on Department of Parks and Recreation (DPR) 523 Series forms (http://ohp.parks.ca.gov/?page_id=1069), previously unrecorded or newly discovered resources information. Provide information necessary for evaluating each newly discovered resource's eligibility for the NRHP and/or the California Register of Historical Resources (CRHR). Ensure the cultural resources specialist completes a technical report detailing the records search results, each survey's methods and results, including identified resources evaluations, and recommendations, based on the NRHP and/or CRHR eligibility criteria. The reports should meet the lead agency's or agencies' published standards.
- 8) Report cultural resource locations using a minimum of one GPS-observed coordinate taken in the approximate, estimated visible center of the resource. Note that for projects located on BLM-managed lands, developers will be required to follow the GPS Recording Standards of the BLM's Cultural Resources Use and Fieldwork Authorization Permits.
- 9) Retain the services of a geoarchaeologist, when appropriate, to investigate and complete a geomorphology technical report. Include the following elements:

- a) Reconstruct the historical geomorphology of the project's Area of Potential Effects (APE).
 - b) Map and date the sediments of the landforms in that area.
 - c) Assess whether buried archaeological deposits may be present and subject to project impacts.
- 10) Submit to the appropriate lead agencies for their review and approval:
- a. Cultural resources specialist's and geoarchaeologist's technical reports.
 - b. Cultural resources DPR 523 Series forms for currently known, previously unrecorded and newly discovered resources.
 - c. A request for confidentiality.
 - d. Materials pertaining to coordination of Native American consultation.
 - e. Mitigation measures to address identified potential impacts on cultural resources recommended as eligible for the NRHP and/or the CRHR.

Projects Under Joint Energy Commission and BLM Jurisdiction

- 1) The standard archaeological field survey coverage for projects under joint Energy Commission and BLM jurisdiction is generally 100 percent, where the project developer's cultural resources specialist anticipates that less than 75 archaeological sites will be present in the project's area of potential effects.
- 2) The standard archaeological field survey coverage for projects under joint Energy Commission and BLM jurisdiction is generally a minimum of 25 percent, if the project developer's cultural resources specialist anticipates that 75 or more archaeological sites will be present in the project's APE. Ensure the project developer's cultural resources specialist consults with BLM and Energy Commission cultural resources staff to design a stratified random sample survey to help ensure that the minimum coverage of 25 percent would result in an archaeological site inventory representative sample in the APE. Include local geomorphology, surface hydrology, and other criteria for the stratification of the sample. If the 25 percent sample survey results in the identification of fewer than 20 sites, 100 percent survey coverage of the APE would be required.
- 3) Submit the appropriate cultural resources specialist's and geoarchaeologist's technical reports, the cultural resources DPR 523 Series forms, as applicable, and materials pertaining to coordinating Native American consultation to BLM. Ensure the submittals:
 - a) Fulfill the administrative conditions of BLM's Cultural Resources Use and Fieldwork Authorization Permits.

- b) Include proposed measures to avoid or reduce, as much as possible proposed project effects. For cultural resources recommended as NRHP and/or CRHR eligible, agencies prefer measures that would avoid site damage and preserve the resources, in place.

Cultural Resources BMPs

Based on their analyses of cultural resources related data, NEPA/CEQA lead agencies require formal, legally binding mitigation plans developed to resolve significant impacts to significant cultural resources. The Energy Commission requires a Cultural Resources Monitoring and Mitigation Plan (CRMMP) for projects subject to its jurisdiction and not requiring a federal authorization, while the BLM requires an agreement document (Memorandum of Agreement [MOA], or Programmatic Agreement [PA]) for projects proposed for siting on BLM-managed lands. Project developers are advised to consult with other applicable lead agencies for addressing cultural resource impacts consistent with their policies/approaches and development of mitigation and/or monitoring plans.

- 1) Retain a qualified cultural resources specialist⁴ to write and carry-out a monitoring and mitigation plan or agreement, when applicable, and to be available if cultural resources are encountered during construction. Avoidance of known cultural resources is generally the preferred resolution option, and include in the plan measures to protect avoided resources during construction, and to prevent looting/vandalism and erosion. If project impacts to known NRHP- and/or CRHR-eligible cultural resources are unavoidable, data recovery may be requested; include a data recovery strategy in the plan. The project developer may also be asked by the appropriate lead agency⁵ to include additional measures for addressing the discovery of previously unknown cultural resources during construction. Consider the following measures, at a minimum:
 - a) Hire a qualified archaeological monitor to oversee project excavations.

⁴A qualified cultural resources specialist has training and background that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 CFR Part 61).

For projects under the Energy Commission's jurisdiction and if cultural/historical resources of any number are present, the Commission's Conditions of Certification will guide the reduction of project impacts to known NRHP- and/or CRHR-eligible cultural resources and provide for the appropriate treatment of previously unknown register-eligible resources encountered during construction.

- b) Develop and use a cultural resources construction personnel training program to promote cultural resources identification and lawful and appropriate response to discoveries.
 - c) Notify involved agencies of unexpected cultural or historical resources discoveries during construction. The project developer may be asked or ordered to cease construction in the vicinity of the discovery to allow evaluation and formulation of appropriate mitigation measures.
 - d) If human remains are discovered, cease construction and consult with the lead agencies. The agencies will likely follow particular state and federal laws that address the treatment of human remains.
 - e) Where unavoidable impacts from project construction are expected, recover data from newly discovered NRHP- and/or CRHR-eligible cultural resources.
 - f) Have the cultural resources specialist prepare a report documenting archaeological monitoring and data recovery activities.
- 2) For projects under joint Energy Commission and BLM jurisdiction where more than 75 archaeological sites are present in the project's APE, and a 25 percent stratified random sample of that area was surveyed, an agreement document will likely be required to complete the survey of the remaining 75 percent of the APE and to specify the resolution of the project's adverse effects on historically significant cultural resources. The BLM, the State Historic Preservation Officer, and, potentially, the Advisory Council on Historic Preservation, in consultation with the Energy Commission, the project developer, Native American groups, and others, will develop the agreement document using the Advisory Council's published guidance (36 CFR 800.6 et seq)
- 3) Expect to provide input to lead agency-prepared mitigation plans, agreement documents and related historic properties treatment plans. Treatment plans will guide:
- a) Completion of a 100 percent archaeological surface survey (if not completed earlier in the permitting/pre-construction phase).
 - b) Outstanding geoarchaeological investigations.
 - c) Evaluation of newly identified cultural resources for NRHP and/or CRHR eligibility.
 - d) Assessment of project impacts to NRHP- and CRHR-eligible cultural resources.
 - e) Development of measures to address the effects of the project on such eligible resources to avoid or reduce impacts as much as possible.

Electricity Transmission Guidance

Linear routing and interconnection of transmission lines may require lengthy upgrades or new rights-of-way. Generally, agencies will conduct transmission siting consistent with the following state policies (Statutes 1988, Chapter 1457):

- Encourage the use of existing rights-of-way by upgrading existing transmission facilities where technically and economically justifiable.
- When new transmission line construction is required, encourage expansion of existing rights-of-way, when technically and economically feasible.
- Provide for the creation of new rights-of-way when justified by environmental, technical, or economic reasons, as determined by the appropriate licensing agency.
- Where there is a need to construct additional transmission, seek agreement among all interested utilities on the efficient use of that capacity.

In addition to transmission line upgrades or new line segments, renewable energy development in remote desert areas may require construction of a new transmission substation, lengthy telecommunication (including fiber optic) lines, and possibly relocation of existing lines. Lead agencies, DFG, and FWS will likely require transmission facility location (including peripheral linear features such as telecommunication lines) surveys on a timely basis for sensitive environmental (biological and cultural) resources and inclusion of the survey results in project applications (see the biological resources and cultural resources sections in this chapter). Project developers are advised to meet early and often with the staffs of the interconnecting utility and the California ISO or other transmission control area operator to determine the location/route, size, length, and visual character of new or upgraded facilities. Presenting comprehensive physical transmission structure information to the appropriate agencies as soon as possible for initial feedback on environmental impacts, and later in proposed project applications for thorough analysis, will help expedite the permitting process.

The California Public Utilities Commission (CPUC) has permitting authority over the investor owned utilities' (IOU) transmission facilities which would be downstream from a proposed power plant's first interconnection point. Publically-owned utilities permit and regulate use of their transmission facilities. Permitting activity for upgraded or new transmission facilities may occur after permitting the power plant, depending on the generation facilities' CEQA and NEPA lead agencies. **Appendix A** provides additional information on the regulatory process and agency/utility roles, **Appendix B** describes electricity transmission infrastructure.

- 1) In applications to appropriate lead agencies, provide a copy of the electric transmission interconnection study (for example, California ISO Phase I) from the appropriate control agency. Include in the interconnection study an identification of the transmission impacts beyond the first point of interconnection and acceptable measures to mitigate/alleviate impacts to the transmission network system. When

more than one alternative mitigation measure is identified, indicate in the applications the measure selected by the project developer. Provide for each selected mitigation measure, an environmental analysis sufficient to meet the CEQA requirements for indirect project impacts.

- 2) Alternatively, project developers may choose to include in applications to lead agencies interconnection study requests or large or small generator interconnection process agreement applications, along with proof of payment. Following this alternative approach may lead to delays in environmental review and lead agency permit processing.

Environmental Justice Guidance

Disproportionately high and adverse human health and environmental effects on low-income and minority populations must be adequately analyzed and mitigated, as stated in policies such as Executive Order 12898: “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”. The appropriate data may be gathered by the project developer or agency, depending on lead agency procedures. For example, the Energy Commission uses internal resources to gather the U.S. Census Bureau data, while the BLM and other agencies require the applicant to provide the data. Also, the BLM and possibly other agencies expect project developers to conduct analyses of potential effects and propose, when warranted, mitigation.

- 1) Identify the minority and low-income populations within the geographic area affected by the renewable energy project. Provide U.S. Census Bureau data to determine whether the facility would be located near a minority population or a population where 50 percent or more of the residents have an income below the poverty level.

Different agencies use different criteria for determining the affected geographic area. The Energy Commission generally assesses potential effects within a six-mile radius of such populations. For the BLM, the geographic area can be determined on a case-by-case basis in consultation with the appropriate field office to identify affected communities.

- 2) Identify the history of multiple and cumulative exposures to health and environmental hazards for the identified low-income and minority populations. Analyze if and how the proposed project has the potential to contribute to low-income and minority population multiple or cumulative health or environmental hazards exposures.
- 3) Analyze how the proposed action would impact the affected community’s social structure or other interrelated cultural, social, occupational, historical, or economic factors that may amplify the natural and physical proposed project environmental effects.

- 4) Work with affected low-income and minority communities to develop appropriate mitigation measures to reduce environmental, human health, social, and economic proposed project related impacts on identified minority and low-income populations.
- 5) Identify linguistic, cultural, institutional, or geographic barriers to effective low-income and minority population public participation in the affected area.
- 6) Develop effective public participation strategies to overcome linguistic, cultural, geographic, and institutional barriers to participation. These strategies might include coordination with individuals and organizations in the affected communities to provide and distribute potential health and environmental impact information, translation and/or summarization of important documents and information, and the provision of opportunities for public participation through means other than written communication.

Environmental Justice BMPs

BMPs to mitigate visual, noise and dust, environmental, health, and economic impacts on low-income and minority populations are pertinent for addressing environmental justice issues.

- 1) Initiate public information campaigns to make affected communities aware of adverse human health effects or exposure to environmental hazards during the construction, operation, and decommissioning of renewable energy projects.
- 2) Work with affected communities to develop appropriate measures to mitigate for economic impacts to low-income and minority populations. In the case of unequal access to employment for the construction and operation of renewable energy facilities, mitigation measures might include technical or vocational training for low-income and minority populations.

Hazardous Materials, Pesticides, and Waste Management Guidance

- 1) For projects proposed on previously disturbed or developed lands, conduct a Phase I site assessment (ASTM E1527 or other equivalent assessment method deemed acceptable by the appropriate regulatory oversight agency) for the project site and linear appurtenances. If Phase I identifies environmental conditions, concerns, or data gaps requiring additional site assessment to adequately characterize the site, conduct additional site assessment work (such as Phase 2) with appropriate regulatory agency oversight. Provide the Phase I, and if conducted, the Phase 2 site assessment with applications to appropriate lead agencies.
- 2) Where a site may be contaminated or classified as a “brownfield” site, consult with state and local agencies (Department of Toxic Substance Control, RWQCB, or designated local agencies) that would regulate remediation and development. Ensure

that necessary remediations will be conducted in accordance with an approved remedial action plan.

- 3) Design project facilities and operations to minimize spills and lessen frequency and intensity of accidents.

Hazardous Materials, Pesticides, and Waste Management BMPs

- 1) Ensure that on-site workers are fully trained to properly handle and are informed about each of the hazardous materials to be used on-site.
- 2) Prepare a hazardous materials management plan addressing storage, use, transportation, and disposal of each hazardous material anticipated to be used, stored, or transported to the site. Identify, for implementation during all phases of the project, inspection procedures, storage requirements, storage quantity limits, inventory control, use of nonhazardous product substitutes when feasible, and disposition methods for excess materials. Identify federal and local emergency response authority notice requirements in emergency response plans. Contact the local certified unified program agency (CUPA) for requirements and enrollment in the CUPA's hazardous waste generator program. If the plan calls for treating hazardous waste onsite, consult with the CUPA on and obtain from the state or local permitting agency the required authorizations for the treatment activity.
- 3) If environmental site assessments (as recommended in **Hazardous Materials, Pesticides, and Waste Management Guidance**) determine that remediation is necessary, ensure the remediation activities are conducted in accordance with the appropriate regulatory agency requirements and oversight. Demonstrate that the site has been cleaned up in accordance with applicable laws, ordinances, regulations, and standards.
- 4) Prepare a construction and operation waste management plan identifying the waste streams that are expected to be generated at the site. Address hazardous waste determination procedures, waste storage locations, waste-specific management, recycling, and disposal requirements, inspection procedures, inventory selection and control, and waste minimization procedures. Implement the plan in compliance with the Clean Water Act National Pollutant Discharge Elimination System (NPDES) permit requirements during all phases of the project and address solid and liquid wastes that may be generated at the site. Consider, for example, the following in the plan:
 - a) Identifying and controlling practices that produce wastes and wastewater, such as: metal fabrication, zero liquid discharge residue, grinding and finishing, storing and disposing of solid and liquid waste, vehicle and equipment refueling, maintenance service, washing, engine cleaning, and parking.
 - b) Ensuring non-hazardous wastes are properly contained, covered, and removed periodically for disposal at appropriate off-site permitted disposal facilities.

- 5) Prepare a spill prevention and response plan identifying where hazardous materials and wastes are stored on site, spill prevention measures to be implemented, training requirements, appropriate spill response actions for each material or waste, the locations of spill response kits on site, a procedure for ensuring that the spill response kits are adequately stocked at all times, and procedures for making timely notifications to authorities. Carry-out the plan during all phases of project development. Consider including the following practices, at a minimum, in the plan:
 - a) Placing equipment and vehicle maintenance and repair areas under a roof.
 - b) Working on engines, transmissions, and miscellaneous repairs, and changing automotive fluids (brake fluid, transmission fluid, gear oil, radiator fluids, and air conditioner Freon or refrigerant) in a covered area using drip pans when there is a likelihood of leaks or spills.
 - c) Promptly cleaning up vehicle leaks, using a rag or absorbent material; properly disposing of used rags or spent sorbents.
 - d) Locating fueling vehicles where spills or leaks will be contained and quickly cleaned up.
- 6) Ensure secondary containment is provided for on-site hazardous and extremely hazardous materials and waste storage, including fuel. In particular, it is recommended fuel storage (for construction vehicles and equipment) be a temporary activity occurring only for as long as is needed to support construction activities.
- 7) In the event of an accidental hazardous waste release to the environment, document the event, including a root cause analysis, appropriate corrective actions taken, and a characterization of the resulting environmental or health and safety impacts. Provide: timely notification to responsible agencies in the event of a reportable release, and event documentation to the permitting agencies and other federal and state agencies within 30 days or another appropriate timeframe.
- 8) If pesticides are used on the site, prepare an integrated pest management plan to ensure that pesticide applications would be conducted within the framework of state and federal policies and entail only the use of USEPA registered and state approved pesticides that permitting agencies have authorized. Limit pesticide use to non-persistent, immobile pesticides. Apply pesticides in accordance with label and application permit directions and terrestrial and aquatic applications stipulations. Use, store, and dispose pesticides in accordance with their labels.
- 9) If potentially contaminated soil (as evidenced by discoloration, odor, detection by handheld instruments, or other signs) is identified at either project or linear facility sites, ensure a qualified professional civil engineer, professional geologist or registered environmental assessor inspects the site. Determine the need for sampling to confirm the nature and extent of contamination, before continuing activities in the area of the

suspected contamination. Stop project construction in the area until the suspected contamination is assessed and remediated as necessary to comply with applicable environmental and worker health and safety laws, ordinances, regulations, and standards.

- 10) Avoid rinsing herbicide/pesticide spray tanks in or near water bodies.
- 11) Minimize herbicide/pesticide treatment in areas that have a high risk for groundwater contamination.
- 12) Determine the risk of herbicide/pesticide contamination when such substances are used to control vegetation. Consider the weather, soil type, slope, and vegetation type.
- 13) Use appropriate herbicide-free/pesticide-free buffer zones for herbicides not labeled for aquatic use, based on permitting agency or BLM/U.S. Forest Service risk assessment guidance. The federal guidance suggests minimum widths of 100 feet for aerial applications, 25 feet for applications dispersed by vehicle and 10 feet for hand-spray applications.
- 14) Provide a debris management plan and a performance guarantee per the applicable local government's construction and demolition recycling program and ensure compliance with applicable diversion program requirements.
- 15) Remediate hazardous product leaks and chemical releases that constitute a Recognized Environmental Condition before completing decommissioning.

Land Use/Agriculture Guidance

- 1) Provide proof of project site control or ownership (legal documentation).
- 2) Consider use of degraded lands, to the extent feasible, for development of renewable energy facilities.
- 3) Design the project to comply with applicable federal, state, and local laws, ordinances, regulations, and standards including the Subdivision Map Act, California Land Conservation Act, and local permitting requirements.
- 4) On privately owned lands, assess the impacts of the proposed project on agriculture, farmland, and grazing operations through use of the California Agricultural Land Evaluation and Site Assessment model. Develop feasible measures to reduce impacts.
- 5) Ensure a project on agricultural land under a Williamson Act contract is consistent with the land uses allowed under the contract. If locating the projects on contracted lands requires termination of the contract, the siting process will be significantly delayed as the contract must be terminated by the land owner and the county following prescribed steps and lengthy time frames.

- 6) Meet with local agencies and elected officials before filing permit or approval applications to ensure the project is to be located on appropriately zoned land. Include a statement from the local agency and the governing body that they have reviewed the proposed project and that it would be consistent with the general plan, zoning ordinances, land use, hydrology, aesthetics, transportation, safety, noise, water use, traffic, and height policies, programs, and limitations. If a conditional use permit is required by the local agency, include a copy of the conditional use permit application with applications to lead agencies. Application processing may be delayed for projects requiring land use designation changes, depending on lead agency requirements. Refer to **Attachment III** for local zoning ordinances and general plan element examples. Upon publication in 2010/2011, the Energy Commission's *Energy Aware Facility Siting and Permitting Guide* is expected to assist local governments with developing general plan energy and transmission elements and provide guidance on electricity generation and transmission planning/ permitting. These resources may aid understanding of local government issues and concerns.
- 7) Consult the Office of Planning and Research mapping tool to identify whether the proposed project is located in the vicinity of military bases and military airspace. This mapping tool will help developers comply with legislation that requires the military to be notified of certain development applications and general plan actions. The mapping tool is available on the Internet at <http://sample1.casil.ucdavis.edu/Calmap8/>.
- 8) DOD entities request early notification with the military to address potential concerns with a proposed energy development project. DOD concerns will address: current and future military testing and training missions, Military Operating Areas, Military Training Routes, air space, Special Use Airspace, airfield surfaces, Terminal Operations, air and ground safety operations, Remote Support Sites (radars, microwaves, and communications towers), installation access, and other military areas and activities. The traffic and transportation sections in this chapter address military and other aviation issues.
- 9) If the BLM Resource Management Plan must be amended, include a completed BLM application.
- 10) Ensure the proposed facility site contains adequate area for construction laydown and staging, parking for construction and operation worker vehicles, and site traffic circulation aisles.
- 11) Evaluate potential public access and public park land impacts and identify related, appropriate measures to address the impacts. Public access and public park uses that could be impacted include dirt and paved roads, ways, routes, trails, and open access areas used for pedestrian, pet, or vehicle access.

Noise and Vibration Guidance

- 1) Consider locating facilities more than 0.5 mile from sensitive noise receptors, including quiet recreation, churches, medical care facilities, schools, child care facilities, public parks and public recreation areas, residences, and wildlife/wilderness areas.
- 2) Take measurements to assess the existing background noise levels at a given site and compare them with the anticipated noise levels associated with the proposed project.
- 3) Prepare a noise monitoring and mitigation plan. Design the project to: minimize noise impacts to sensitive noise receptors, limit increases to less than a five to 10 dBA increase above ambient levels, and not exceed local noise standards. Address project-generated noise impacts as much as possible. Consider acquiring lands to serve as buffers around the proposed facilities.

Noise and Vibration BMPs

- 1) Limit noisy construction activities (including truck and rail deliveries, pile driving, and blasting) to the least noise-sensitive times of day (such as weekdays between 7 a.m. and 7 p.m.) for projects near residential or recreational areas.
- 2) Consider use of noise barriers, such as berms and vegetation, to limit project-generated noise at plant property lines, especially where sensitive noise receptors may be present.
- 3) Ensure project equipment has the appropriate sound-control devices and shield impact tools. Use battery-powered forklifts and other facility vehicles, and flashing lights instead of audible back-up alarms on mobile equipment.
- 4) Locate stationary construction equipment (such as compressors and generators) as far as practical from nearby residences.
- 5) If blasting or other noisy activities are required during the construction period, notify nearby residents and the permitting agencies 24 hours in advance.
- 6) Properly maintain mufflers, brakes, and loose items on construction and operation related vehicles to minimize noise and ensure safe operations. Operate trucks as quietly as possible, while considering local conditions. Advise about downshifting and vehicle operations in residential communities to keep truck noise to a minimum.
- 7) Install mufflers on diesel and gas-driven engine air coolers and exhaust stacks. Equip emergency pressure relief valves and steam blow-down lines with silencers to limit noise levels.
- 8) Contain project facilities within buildings or other types of effective noise enclosures, when necessary and feasible.

- 9) Employ engineering controls, including sound-insulated equipment and control rooms, to reduce the average noise level to appropriate levels in normal work areas.

Paleontological Resources Guidance

- 1) Retain the services, as appropriate, of a paleontological resources specialist with training and background that conforms with vertebrate paleontologist minimum qualifications described in *Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontologic Resources: Standard Procedures*, Society of Vertebrate Paleontology, 1995 <http://www.vertpaleo.org/society/polstateconfomimpactmigig.cfm>.
- 2) Conduct, as appropriate, an initial scoping assessment to determine whether proposed construction activities would disturb formations that may contain important paleontological resources. Have the paleontological resources specialist conduct the scoping assessment in accordance with applicable agency requirements.⁶ For projects proposed to be located on BLM or U.S. Forest Service managed lands, consult the BLM's website (http://www.blm.gov/wo/st/en/prog/more/CRM/paleontology/paleontological_laws.html) for paleontological resources assessment and mitigation guidance.
- 3) Determine, in the assessment, whether paleontological resources would likely be disturbed in a project area on the basis of the area's sedimentary context and a records search for past paleontological finds in the area. Consult the University of California Museum of Paleontology Collections on-line database (<http://www.ucmp.berkeley.edu>).
- 4) Avoid whenever possible, potential impacts to paleontological resources by moving the construction site or removing/reducing the need for surface disturbance.
- 5) The assessment may suggest areas of high known potential for containing resources. If the assessment is inconclusive, a surface survey is recommended to determine the fossiliferous potential and extent of the pertinent sedimentary units within the project site. If the site contains areas of high potential for significant paleontological resources and avoidance is not possible, prepare a paleontological resources management and mitigation plan that addresses the following elements:

⁶ The Paleontological Resources Protection Act of 2009 provides criminal penalties for persons who “excavate, remove, damage, or otherwise alter or deface any paleontological resources located on Federal lands” unless the resources (fossils) are collected in accordance with the Act. The Act charges the Secretary of the Interior with promulgating regulations to carry out the Act.

- a) A preliminary survey (if not conducted earlier) and surface salvage before construction.
 - b) Physical and administrative protective measures and protocols such as halting work, to be implemented in the event of fossil discoveries.
 - c) Monitoring and salvage during excavation.
 - d) Specimen preparation.
 - e) Identification, cataloging, curation, and storage.
 - f) A final report of the findings and their significance.
- 6) Choose a site that avoids areas of special scientific value.

Paleontological Resources BMP

Develop a protocol for unexpected paleontological discoveries. Bring to the immediate attention of the appropriate permitting agencies unexpected discovery of fossils during construction. Halt work near the discovery to avoid further disturbance to the resources during evaluation and development of appropriate mitigation measures.

Safety, Health, and Nuisances Guidance

- 1) Contact the local fire protection district or if necessary, California Department of Forestry and Fire Protection (CALFIRE, Office of the State Fire Marshall) to locate fire hazard severity zones near the proposed project site. Determine whether the site would be located in a fire hazard severity zone within State Responsibility Areas, a Local Agency Very High Fire Hazard Severity Zone, or a Wildland-Urban Interface Fire Area. Address related local agency fire protection building standards.
- 2) Survey project sites for unexploded ordnance, especially if projects are within 20 miles of a current DOD installation or formerly used defense site.
- 3) Establish setbacks or consider acquiring buffer lands to separate nearby residences and occupied buildings from the proposed facility to minimize impacts from sun reflection, low-frequency sound, electromagnetic fields (EMF), construction and operation noise, air pollution, and facility related hazards and wastes.
- 4) Design the project to reduce electromagnetic interference (EMI) (for example, impacts to radar, microwave, television, and radio transmissions) and comply with Federal Communications Commission (FCC) regulations. Conduct signal strength studies when proposed locations have the potential to affect FCC licensed transmissions. Reduce to nil potential or real interference with public safety communication systems (for example, radio traffic related to emergency activities) or the amateur radio bands.

- 5) Conduct appropriate studies to determine project facility seismic hazards risk and design criteria to meet the latest California Building Code standards. Address issues related to Alquist-Priolo earthquake fault zones, seismic shaking, and related ground failure and fault rupture.

Safety, Health, and Nuisances BMPs

- 1) Prepare a health and safety program to protect workers and the public during construction, operation, repowering, retrofitting, closure/decommissioning, or abandonment. Describe potential safety issues, worker training programs, and other practices to address site access, construction, safe work practices, security, heavy equipment transportation, traffic management, emergency procedures, and fire control. For example, consider the following specific practices:
 - a) Providing adequate ventilation in work areas to reduce heat and humidity.
 - b) Reducing time required for work in elevated temperature environments, and ensuring easy access to drinking water in such environments.
 - c) Providing shields for workers from hot equipment, including generating equipment, pipes, and other equipment.
 - d) Installing warning signs near high temperature surfaces and requiring personal protective equipment, as appropriate, including insulated gloves and shoes.
 - e) Insulating control rooms for sound to achieve noise levels below 60 dBA, when occasional speech and telephone use is expected.
 - f) Installing warning signs in high noise areas and requiring that personal noise protecting gear be used when working in identified high noise areas (typically areas with noise levels greater than 85 dBA).
 - g) Providing an automatic electronic defibrillator.
- 2) Install and maintain permanent fencing (approved by permitting agencies) around electrical substations and mechanical and electrical generation equipment. Lock equipment access doors to limit public access.
- 3) Establish measures to be taken during construction and operation phases to limit public access to hazardous facilities.
- 4) Prohibit workers or visitors, with the exception of law enforcement personnel, from bringing firearms or weapons to the project site.
- 5) Prepare a fire management and protection plan to prevent, minimize the effects of, and respond to human-caused or natural-caused fires. Carry-out the plan during all phases of project development. Train site workers to respond, as appropriate, to fires. Maintain a 30-foot firebreak within the fenced area containing project facilities.

- 6) Employ engineering controls, including sound-insulated equipment and control rooms, to reduce the average noise level in normal work areas.
- 7) Provide personnel with hearing protection when noise levels are expected to be above 85 dBA.
- 8) In the event the project results in EMI, mitigate the problem to the extent appropriate for the owner of the impacted communications system. Convey additional warning information to aircraft with onboard radar systems, the FAA, and DOD so that solar and electrical transmission facility radar echoes will be quickly recognized.
- 9) Remove from the project site and properly dispose construction refuse, including, but not limited to, broken equipment parts, wrapping material, cords, cables, wire, rope, strapping, twine, buckets, metal or plastic containers, and boxes.
- 10) Design the project according to standard engineering recommendations from geotechnical investigations required by the latest applicable California Building Code. Address potential geologic hazards including strong ground shaking, liquefaction, settlement due to compressible soils, groundwater withdrawal, hydrocompaction, or dynamic compaction, and possible presence of expansive clay soils.

Soils, Drainage, Erosion, Stormwater, and Flooding Guidance

- 1) Conduct soil surveys to identify soil types and the typical silt content of soils based on guidance from appropriate agencies.
- 2) Use soil samples of the less than 400 mesh size fractions (less than 38 microns) for chemical analysis to approximate the chemical make-up of the suspendable fraction of road dust and soil. This measurement indicates whether toxic metals may be transported with this fugitive dust. Fugitive dust abatement plans; **Air Quality Guidance 5)** may address or partially address this issue.
- 3) Use fugitive dust computer-model predictions to evaluate various control scenarios (for example, watering, soil stabilizers, vehicle speed limits).
- 4) Provide preliminary site grading plans and drainage, erosion, and sediment control plans with applications to applicable lead agencies and to appropriate local jurisdictions. Avoid, as much as possible, locating facilities on steep slopes, in alluvial fans, and other areas prone to landslides or flash floods, or with gullies or washes. Address local building, water quality, drainage and flood control permit requirements, as well as lead agency requirements. For projects to be located on BLM managed lands, address applicable requirements when siting projects in floodplains.
- 5) Submit a draft Notice of Intent and a draft storm water pollution prevention plan (SWPPP) to the appropriate lead agencies, for advance review. Consult with the State Water Resources Control Board (SWRCB) or RWQCB, if possible. Ensure the SWPPP is prepared by a certified SWPPP professional. If the proposed project will be subject to

the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Construction Permit), ensure the plan addresses the latest SWRCB requirements. As the state's storm water program develops the RWQCBs may issue general permits or individual permits containing more specific permit provisions. Consider addressing the following topics in the draft SWPPP:

- a) Vicinity map.
 - b) Site delineation including location of watercourses and other critical drainage/erosion areas relative to proposed project construction, laydown, landscape, transmission and pipeline corridor areas.
 - c) Drainage map and measures.
 - d) Clearing and grading plans, including material to be excavated and used for fill.
 - e) BMPs plan and description of erosion and sediment control practices.
- 6) Evaluate flood zoning and determine whether the site is located within a Flood Hazard Zone and/or the development would result in flood plain modifications. Determine 100-year floodplain potential at the project location and avoid areas prone to flooding, as appropriate. Include results of the evaluation, and if appropriate, measures to address floodplain modifications.
 - 7) Consult with the appropriate RWQCB for Clean Water Act (CWA) Section 401 Water Quality Certifications necessary for wetlands impacts and CWA Section 404 dredge and fill permits.

Soils, Drainage, Erosion, Stormwater, and Flooding BMPs

- 1) Prepare and carry-out a drainage, erosion, and sedimentation control plan that ensures proper protection of water quality and soil resources, demonstrates no increase in off-site flooding potential, and includes provisions for project site stormwater and sediment retention. Design facility areas consistent with local standards and standard engineering design practices. Identify site surface water runoff patterns and develop mitigation measures to prevent excessive and unnatural soil deposition and erosion on the project site, in construction areas, and in areas downslope of the project. Consider guidance in *Developing Channel Maintenance Programs for Engineered Drainages*, **Attachment II**, as applicable. Design the project to minimize site disturbance during construction , operation, repowering/retrofit, and decommissioning, for example:
 - a) Stabilize disturbed areas that will not be covered with structures or pavement following grading and/or cut and fill operations by moisturizing and compacting the soils.

- b) Save removed topsoil for reuse, when possible, by segregating and stockpiling the material. Cover material to prevent erosion.
 - c) Direct runoff from parking lots, roof, or other impervious surfaces to the immediate landscape or retention basins.
 - d) Minimize stormwater runoff contamination from vehicle refueling and repair areas by containing such activities to work areas where runoff is collected or controlled.
 - e) Use landscaping that requires little or no irrigation and recess the plantings to create retention basins/areas to capture runoff. Avoid using invasive species (such as, but not limited to Sahara mustard, Red Brome, Cheat-grass, Fountain grass, Tamarisk) for erosion control and soil stabilization seeding planting.
 - f) Reduce the amount of area covered by impervious surfaces through use of permeable pavement or other pervious surfaces.
 - g) Maintain natural drainages and pre-project hydrographs for the area.
 - h) Conduct regular inspections of permanent erosion control measures to ensure long-term effectiveness.
 - i) After decommissioning, install erosion control measures in disturbed areas where potential for erosion exists.
- 2) Prepare and provide to the RWQCB and/or the SWRCB, as applicable, a SWPPP for the site before construction mobilization to ensure compliance with applicable regulations. The SWPPP will contain measures to prevent off-site migration of contaminated storm water or increased soil erosion.
 - 3) If the project will modify the flood plain, submit an application to FEMA or county requesting map revisions. Provide copies of the completed application to appropriate lead agencies.
 - 4) Conduct post-construction monitoring of areas that were disturbed during the construction phase, and apply appropriate mitigation in a timely manner.

Traffic and Transportation Guidance

Roads

- 1) Minimize the number and length of access, internal, service, and maintenance roads; use existing roads when feasible. As much as possible, avoid use of traffic routes that cross BLM-designated Open Routes of Travel and result in increased road construction.
- 2) Provide for safe ingress and egress to/from the proposed project site. Identify road design requirements for proposed private and state roads and related road

improvements (such as highway widening and stacking lane installation), in coordination with applicable local and state transportation agencies.

- 3) If new roads are necessary, prepare a road siting plan and consult standards contained in *BLM 9113 Manual* (<http://www.oilandgasbmps.org/docs/GEN96-9113.pdf>) and/or state and local requirements. Include design and construction protocols to ensure roads will meet the appropriate standard and be no larger than necessary to accommodate their intended functions (for example, traffic volume and weight of vehicles). Locate access roads to avoid or minimize impacts to washes and stream crossings, follow natural contours, and minimize side-hill cuts. Design roads internal to a project site to minimize ground disturbance. Avoid excessive grades on roads, road embankments, ditches, and drainages, especially in areas with erodible soils.
- 4) Prepare a traffic management plan to ensure that hazards from the increased truck traffic would be eliminated or minimized and that traffic flow would not be adversely impacted. *BLM 9113 Manual* and *The Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development* (revised 2007) provide standards for development on federal lands. For portions of plans addressing state and local roads, use applicable state and local guidance and standards. Identify and address issues such as location of school bus routes, stops, and schedule. Consider the following when preparing the plan:
 - a) Proximity (within 1,500 feet) to congested roads, hazardous road design features.
 - b) Siting exits/entrances with clear views (at least 200 feet in either direction) of access roads.
 - c) Whether construction/operation related traffic will lower the level of service on public streets within a one mile radius of the facility site.

State whether access roads need to be built or existing roads are most appropriate for transporting building materials and heavy-duty equipment. To address identified road hazards, incorporate measures such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify necessary changes in temporary lane configuration.

- 5) If railroad crossings require improvements for safe crossing, consult with the appropriate railroad and the CPUC for permitting requirements.

Aviation

- 1) Meet with the local Airport Land Use Commission. In applications to appropriate lead agencies, provide a copy of a letter stating that the proposed project is compatible with the Airport Land Use Compatibility Plan. The following locations and design features may contribute to a decision that the facility is incompatible with operations of a nearby airport:

- a) Siting the facility within 20,000 feet (3.8 miles) of a runway that is at least 3,200 feet in actual length, or 5,000 feet from a heliport.
 - b) Locating portions of a facility within a designated airport safety zone, airport influence area, or airport referral area.
 - c) Introducing a thermal plume, visible plume, glare, or electrical interference into navigable airspace on or near an airport.
 - d) Proposing a structure that will exceed 200 feet in height above ground level.
- 2) Consult with the FAA regarding the heights of the project structures and avoid conflicts with aviation. Design the project to comply with FAA regulations, including lighting regulations, and to avoid potential safety issues associated with proximity to airports or landing strips.
 - 3) Complete FAA Form 7460, provide to FAA (<http://oeaaa.faa.gov>), and include a copy in applications to appropriate lead agencies.
 - 4) Consult with representatives from the appropriate military installation for projects to be located under low-level military airspace. Design the project to address military concerns. Refer to **Land Use Guidance 8**) for more detail.

Traffic and Transportation BMPs

Roads

- 1) For road construction and maintenance on BLM lands, follow established policy and guidelines within BLM *Manual 9113 – Roads*. For road construction and maintenance on other lands, consult with and follow state, local, and/or other appropriate transportation agency policy and guidelines.
- 2) Abandon, recontour, and restore roads that are no longer needed using weed-free native grasses, forbs, and shrubs based on BLM, FWS, and/or DFG recommendations.
- 3) Prepare a transportation plan for implementation during all phases of the project. Address methods for reducing construction worker traffic volumes and project-related equipment and materials transport.
 - a) Consider providing a construction worker rideshare program.
 - b) Consider scheduling shift changes and deliveries to avoid conflict with peak-hour traffic patterns.
 - c) Describe transport of facility hazardous and non-hazardous materials, components, main assembly cranes, and other large pieces of equipment.
 - d) Consider specific object sizes, weights, origin, destination, peak-hour traffic, and unique handling requirements and evaluate alternative transportation approaches.

- 4) Obtain vehicle oversize and overweight permits, as appropriate.
- 5) Obtain encroachment permits from appropriate agencies.
- 6) Evaluate road use on an ongoing basis, approaches for minimizing traffic volume, and ensuring that roads are maintained adequately to minimize associated impacts.
- 7) Consult with local planning authorities regarding increased traffic during the construction phase. Consider conducting an assessment of the vehicle numbers per day, their size, and type.
- 8) Agencies will likely require that signs are placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local commuters, consider limiting construction vehicles travel on public roadways during the morning and late afternoon commute times.
- 9) Restrict traffic to the roads specified for the project. Restrict use of unimproved roads to emergency situations involving potential injury or loss of life.
- 10) Instruct project personnel and contractors to adhere to speed limits commensurate with road types, traffic volumes, vehicle types, and site-specific conditions, to ensure safe and efficient traffic flow and to reduce wildlife collisions, disturbance, and airborne dust. Consider requiring driver attendance at traffic safety awareness training.
- 11) Regularly inspect vehicle tires and replace faulty tires before they fail.
- 12) Implement a program with truck owner/operators to cover loads per California Vehicle Code 23114(a); sweep, clean or hose truck and trailers after loading,, unloading, and before entering a public road.
- 13) Repair or reconstruct to pre-project conditions project-related access roads that are damaged by project construction.
- 14) Locate and construct structures crossing washes or streams so that they do not decrease channel stability or increase water velocity, and erosion and surface water runoff changes are avoided.
- 15) Control potential soil erosion at culvert outlets with appropriate structures, road building or use. Clean and regularly maintain catch basins, roadway ditches, and culverts.

Aviation

- 1) Avoid or address impacts to air traffic safety. So that interference from electrical generation facilities can be quickly recognized by aircraft with onboard radar systems, work with the FAA to determine best practices for mitigating the interference and conveying warning information to the aircraft.

- 2) Notify the FAA of structures greater than 200 feet above grade, construction or alteration of navigable airspace within 5,000 feet from a heliport or 20,000 feet of airport runways more than 3,200 feet in length, via the filing of FAA Form 7460 (<http://oeaaa.faa.gov>).
- 3) Avoid or address impacts to low-level military airspace. Work with military points of contact found at the following website:
http://www.opr.ca.gov/military/docs/military_Mailing_Addresses_SB1462.pdf to determine best practices for conveying aircraft warning information and mitigating interference from electrical generation facilities. Notify the appropriate representatives of proposed construction or alteration of navigable airspace in low-level military airspace.

Visual Resources Guidance

- 1) Consider, as early as possible, visual resources in the project planning and siting phase. Include a professional landscape architect on the project planning team to evaluate and address visual resource issues as project siting options are reviewed.
- 2) Prepare a site design and lighting plan. Include elements such as, integrating project site and facility design with the surrounding landscape, minimizing the profile of the ancillary structures, burying cables, minimizing use of commercial symbols, and using non-glare, low-energy non-reflective lighting.
- 3) Consult with appropriate federal, state, and local lead agencies for selection of key observation points and appropriate methods for analyzing proposed project visual effects. Consult with BLM on use of tools and methods for assessing impacts and completion of Visual Resources Management designations, for projects to be located on BLM lands. Include the designations, where applicable, and visual resource analyses in applications to the appropriate lead agencies.
- 4) Consider visual impacts of the proposed facilities and transmission lines, from relevant viewing angles when selecting building sites and locations. Consider visual impacts from frequent water vapor plumes if cooling towers are proposed.
- 5) Consider the landscape character when considering placement of facilities.
- 6) Use, as appropriate, digital terrain mapping tools at a landscape-viewshed scale for site planning and design, visual impact analysis, and visual impact mitigation planning and design. Use digital terrain mapping tools at a resolution and contour interval suitable for site design and accurate placement of proposed developments into the digital viewshed.
- 7) Perform visual mitigation planning and design through field assessments, applied global positioning system technology, photo documentation, use of computer-aided design and development software, and visual simulations.

- 8) Evaluate the potential proposed project visual impacts on public parklands, National Historic Trails, and related uses and identify appropriate mitigation measures. Depending on the proposed renewable energy technology and location, a trail may be impacted if the project site includes remnants of a National Historic Trail, is located within the viewshed of a trail's designated centerline, or includes or is within the viewshed of a trail eligible for listing on the NRHP.
- 9) Because the landscape setting observed from national historic sites, national trails, and tribal cultural resources may be a part of the historic context contributing to the historic significance of the site or trail, avoid, as appropriate, locating facilities in areas that would alter the visual setting and reduce the historic significance or function.
- 10) Identify potential project related visual impacts on National Scenic Highways and All-American Roads and appropriate mitigation measures. Within 0.25 miles of National Scenic Highways and All-American Roads include project measures to minimize the profile of structures so that the viewshed from the scenic highway is preserved.
- 11) Avoid "skylining" of transmission and other structures; that is, avoid placing facilities on ridgelines, summits, or other locations where they would be silhouetted (when seen from important viewing locations) against the sky. Take advantage of opportunities to use topography as a viewing backdrop
- 12) Site projects away from prominent landscape features (for example, buttes), where possible.
- 13) Follow natural land contours rather than straight lines when siting linear structures, particularly on slopes.
- 14) Take advantage of both topography and vegetation as screening devices to restrict views of projects from visually sensitive areas. Where screening topography and vegetation are absent, use natural-looking earthwork berms and vegetative or architectural screening.
- 15) Minimize the number of structures. Combine and carry-out activities in one structure, or co-locate structures to share pads, fences, access roads, lighting, and other facilities.
- 16) Match and repeat the form, line, color, and texture of the existing landscape when siting and designing facilities, structures, roads, and other project elements.
- 17) Chose low-profile structures whenever possible to reduce their visibility.
- 18) Design and locate structures and roads to minimize and balance cuts and fills. Reducing cuts and fills has numerous visual benefits, including fewer fill piles, landform and vegetation that appears more natural, fewer or reduced color contrasts from disturbed soils, and reduced visual disturbance from erosion and establishment of invasive species.

- 19) Minimize the need for and amount of lighting on ancillary structures. Design and commit to install permanent exterior lighting such that (a) light fixtures do not cause spill light beyond the project site; (b) lighting fixtures are fully shielded, do not cause reflected glare, and use low temperature bulbs; (c) direct lighting does not illuminate the nighttime sky; (d) illumination of the project and its immediate vicinity is minimized by including use of motion detectors or other lighting controls to turn lights off except when needed for security and safety; (e) lighting complies with local policies and ordinances; and (f) use lighting that meets International Dark Sky Association standards, when feasible.

Visual Resources BMPs

- 1) Ensure the public is involved and informed about the visual site design elements of the proposed project. Possible approaches include conducting public participation forums for disseminating information, offering organized tours of operating pertinent renewable energy developments, and using computer simulation and visualization techniques in public presentations.
- 2) Reduce visual impacts during construction by minimizing areas of surface disturbance, controlling erosion, using non-chemical dust suppression techniques, and restoring exposed soils as closely as possible to their original contour and vegetation.
- 3) Color and finish project structure and building surfaces visible to the public to ensure minimal visual intrusion, contrast, and glare. Paint grouped structures the same color to reduce visual complexity and color contrast.
- 4) Establish a regular litter pick-up procedure within and around the perimeter of the project site.
- 5) Use berms and/or decorative landscape plantings, where appropriate, for effective facility screening on the perimeter of the project site and outside of security fencing. Use native, drought -tolerant plants as much as possible.
- 6) Inspect landscaping regularly and replace dead plantings in a timely manner.

Water Supply and Quality Guidance

Project developers are advised of the SWRCB and Energy Commission water policies for cooling of power plants. The 2003 Energy Commission *Integrated Energy Policy Report* states:

“State water policy regarding power plants is specified in Resolution 75-58 adopted by the State Water Resources Control Board (the Board). With respect to using fresh water, the Resolution articulates an underlying policy ‘to protect beneficial uses of the state’s water resources and to keep the consumptive use of freshwater for power plant cooling to that minimally essential for the welfare of the citizens of the state.’ The policy reflects the state’s concerns over discharges from power plant cooling, as well as the conservation of fresh water for cooling purposes. Specifically, the Board

states that it ‘encourages ... power generating utilities and agencies to study the feasibility of using wastewater for power plant cooling’ and ‘encourages the use of wastewater for power plant cooling where it is appropriate.’

The Board also lists specific ‘discharge prohibitions’ to limit the discharge of blowdown and waste waters from cooling facilities so as to ‘maintain existing water quality and aquatic environment of the state’s water resources.’ The Board further states as a matter of principle, ‘Where the Board has jurisdiction, use of fresh inland waters for power plant cooling will be approved by the Board only when it is demonstrated that the use of other water supply sources or other methods of cooling would be environmentally undesirable or economically unsound.’

The Warren-Alquist Act reiterates state water policy in terms of conserving water and using alternative sources of water supply: ‘It is further the policy of the state and the intent of the Legislature to promote all feasible means of energy and water conservation and all feasible uses of alternative energy and water supply sources.’ (emphasis added).

Consistent with the Board policy and the Warren-Alquist Act, the Energy Commission will approve the use of fresh water for cooling purposes by power plants which it licenses only where alternative water supply sources and alternative cooling technologies are shown to be ‘environmentally undesirable’ or ‘economically unsound.’ Additionally, as a way to reduce the use of fresh water and to avoid discharges in keeping with the Board’s policy, the Energy Commission will require zero-liquid discharge technologies unless such technologies are shown to be ‘environmentally undesirable’ or ‘economically unsound.’ The Energy Commission interprets ‘environmentally undesirable’ to mean the same as having a ‘significant adverse environmental impact’ and ‘economically unsound’ to mean the same as ‘economically or otherwise infeasible.’”

Project developers are also advised to consult with local governments, as appropriate, for local water use and quality requirements. Proposed groundwater or surface water use for power plant cooling or other industrial purposes, including mirror washing, would require detailed analysis and may delay the permitting process. The following guidance recommends approaches for being responsive to agency water supply/quality concerns.

- 1) Given scarce water resources in the desert region use of dry cooling technologies for power plant cooling is encouraged and preferred. To the extent that water is proposed for power plant cooling conduct an analysis to demonstrate that alternative water supply sources and alternative cooling technologies are environmentally undesirable or economically unsound. It is recommended the analysis identify land-use, electricity efficiency, and other tradeoffs associated with the proposed cooling technology. See **Appendix B** in under **Solar** and **Geothermal** for discussions on such tradeoffs. Developers are advised that agencies may condition such project permits/authorizations with water conservation offset mitigation measures.

- 2) If recycled water is proposed, provide a “will serve” letter from the water supplier and an approved agreement, a “will serve” letter and approved agreement to return the wastewater stream, and/or provide a plan for a zero liquid discharge (ZLD) system. If the water supply or waste water treatment services are to be supplied by a special district and the proposed project is to be located outside the service boundaries of the district, the Local Agency Formation Commission (LAFCo) will need to approve the project annexation to the district, or approve an “out of service area” contract to provide the services requested. If the supplier of water is a private water company, similar approvals will be required from the CPUC.
- 3) For any planned water use, identify the water sources, legal entitlements, water rights, adequacy of capacity to serve project demands while maintaining aquatic and riparian resources, quantity of water used for project construction and operational needs, and water discharges, including but not limited to construction, systems testing, process and cooling needs, and mirror washing.
- 4) Identify wastewater treatment and pre-treatment measures and new or expanded facilities, if any, to be included as part of the facility’s NPDES permit, if such a permit is needed.
- 5) Where use of recycled water is proposed, submit permit applications to the California Department of Public Health and RWQCB. Include the applications with applications to appropriate lead agencies.
- 6) If use of groundwater is proposed for industrial purposes, ensure a comprehensive analysis of the groundwater basin is provided and the following potential significant impacts are thoroughly evaluated. Address, as applicable, uses that would:
 - a) Exacerbate or create overdraft conditions.
 - b) Cause drawdown in adjacent wells.
 - c) Cause changes in water quality and affects other beneficial use.
 - d) Affect groundwater basins in adjacent areas and states.
 - e) Affect other environmental resources such as springs providing water for plants and wildlife.

Include adequate mitigation for potential impacts and analyze alternative water sources and technologies. Project developers are advised that planned use of groundwater in the portion of the California desert region located in the Colorado River Basin may be restricted and approvals to use such water may be difficult to obtain.

- 2) Where a groundwater well is proposed to be drilled or used, submit a permit application to the appropriate local jurisdiction. Include the application with applications to appropriate lead agencies and provide the following information:

- a) The legal description (township, range, section, and quarter section) of each proposed well to be used for the project, the anticipated pumped capacity of each well in gallons per minute, and the total withdrawal in acre-ft/year. Include the peak pumping rates anticipated during the project. Locate the planned well sites (within the area under application) on a suitable map.
 - b) For wells, identify the aquifer, the aquifer's hydrogeologic characteristics, and its targeted production zone.
 - c) Identify known surface water resources (springs or streams) that may be affected by the proposed pumping, due to a hydraulic connection between surface and ground water.
 - d) The potential cone of depression that might be caused by the proposed pumping. This could be done by use of an analytical model (for example, a well field simulation program such as THWELLS or by use of a numerical model such as MODFLOW). Also, identify the cone of depression's predicted extent and magnitude (in feet of water level drawdown) after 10, 20, and 50 years of operation and/or for the expected life of the project. Discuss the maximum drawdown expected during the life of the project.
 - e) Alternative ways to meet project water requirements that would reduce water requirements. For example, use of dry cooling technology, or use of several concentration cycles for cooling water.
 - f) Plans for monitoring ground water conditions during the life of the project, such as the use of nearby wells to monitor water levels. Start monitoring early in the permitting process; expect to provide agencies with a minimum of one year of data before groundwater is withdrawn for the project. Confer with the appropriate local jurisdiction and/or lead agency when developing details.
- 3) If use of surface water is proposed for industrial purposes, ensure a comprehensive supply analysis is provided and the following potential significant impacts are evaluated and issues are addressed:
- a) Potential impacts to other users or adjacent states.
 - b) Potential use that impacts water quality.
 - c) Potential use that impacts other water resources.
 - d) Potential use that impacts environmental resources, including protected wildlife and fishes.
 - e) Reliability of the water supply proposed for project use.
 - f) Alternative water sources and technologies.
 - g) Mitigation for water use impacts.

- 4) Where use of surface water is proposed for industrial purposes, provide a “will serve” and/or an approved water service agreement/water supply contract with applications to appropriate federal, state, and/or local lead agencies. This may include LAFCo or CPUC approvals, as discussed above.
- 5) Design the project using ZLD technologies so that there is no offsite wastewater discharge.
- 6) Where it can be demonstrated to be infeasible to use ZLD technologies and deep well injection of wastewater disposal is proposed, submit an application to the USEPA. Include the completed application(s) with applications to appropriate lead agencies. Proposing deep-well injection is likely to delay permitting of the proposed project.
- 7) Where it can be demonstrated to be infeasible to use ZLD technologies and evaporation ponds are proposed for wastewater disposal, submit an application to the RWQCB. Include the completed application with applications to appropriate lead agencies. Proposing an evaporation pond is likely to delay permitting time frames for the proposed project.
- 8) Where an on-site septic treatment system is proposed, submit a permit application to the appropriate local jurisdiction and include the application with applications to appropriate lead agencies.

Water Supply and Quality BMPs

- 1) Ensure that wastewater generated in association with temporary, portable sanitary facilities is periodically removed by a licensed hauler and disposed into an existing municipal sewage treatment facility.
- 2) Ensure temporary, portable sanitary facilities provided for construction crews are adequate to support expected on-site personnel. Remove the facilities at completion of construction activities.
- 3) Consider cleaning company vehicles at commercial car washes rather than washing vehicles on the company's property so that dirt, grease, and detergents are treated effectively at existing facilities designed to handle those types of wastes.
- 4) Comply with local requirements for permanent, domestic water use and wastewater treatment.

CHAPTER 4: Renewable Energy Technology Specific Guidance & Best Management Practices

The guidance and BMPs in **Chapters 2 and 3** and the following guidance/BMPs can assist solar, wind, geothermal, and biomass energy project developers and regulatory agencies in completing applications to lead agencies and reducing potential impacts.

Solar Energy Power Plant Guidance and BMPs

Chapters 2 and 3 address most prospective agency solar power plant issues and concerns. The following guidance and BMPs address air, biological, soils, visual, and water resource issues specific to solar facilities.

Guidance

- 1) Prepare a detailed analysis of potential glare effects associated with solar energy collectors/reflectors and associated facilities. Take appropriate preventive steps as warranted by the analysis results, such as installing slatted fences around collector arrays, installing vegetative screens or berms, or adjusting solar collector/reflector position or operation to minimize glare.
- 2) Integrate solar collector/reflector arrays and design with the surrounding landscape as much as possible.

BMPs

- 1) Prepare a soils plan to deal with the redistribution, removal, and/or off-site storage of soil removed during solar project site laser levelings.
- 2) Monitor to determine if there is a potential for bird incineration, collision, blinding, or heat stress mortality. Discuss monitoring methods with BLM, FWS, the Energy Commission, DFG, and/or other appropriate agencies.
- 3) Use flashing or strobe lights on heliostat towers to minimize avian collision risk.
- 4) Use the minimum volume of water necessary for mirror washing. Collecting and recycling the wash water is encouraged.
- 5) Address in decommissioning/abandonment plans approaches for removing solar panel arrays, restoring the surface grade and storing, and placing soils on the disturbed site. Replaced soils should support, as much as possible, native plant community establishment and maintenance (see **Chapter 3 Biological Resources BMPs, General to Any Species of Interest**, 26)).

Wind Energy Power Plant Guidance

In addition to considering the guidance recommended in **Chapters 2 and 3**, it is recommended project developers refer to the volunteer *California Guidelines for Reducing*

Impacts to Birds and Bats From Wind Energy Development (California Guidelines) (California Energy Commission and California Department of Fish and Game 2007) for projects proposed to be located within state and local agency jurisdictions. Although Federal agencies are developing guidelines to address projects within their jurisdictions, they may find the California Guidelines applicable to projects located within their jurisdictions. The executive summary is provided in *Best Management Practices and Guidance Manual: Desert Renewable Energy Projects*, **Appendix D**. The California Guidelines lead the developer through the steps addressing bird and bat impacts, and wind energy development issues of concern.

The California Guidelines are a science-based collaboration between the Energy Commission and DFG and provide information to help reduce impacts to birds and bats from new California development or wind energy repowering projects. The Guidelines address the following topics:

Chapter 1: Preliminary Site Screening

Chapter 2: CEQA, Wildlife Protection Laws, and the Permitting Process

Chapter 3: Pre-Permitting Assessment

Chapter 4: Assessing Impacts and Selecting Measures for Mitigation

Chapter 5: Operations Monitoring and Reporting

The DOI formed the Wind Turbine Guidelines Advisory Committee to recommend to the Secretary effective measures for avoiding or minimizing wildlife and habitat impacts related to land-based wind energy facilities. The final recommendations (forwarded to the Secretary in 2010) are posted on the following website:

http://www.fws.gov/habitatconservation/windpower/wind_turbine_advisory_committee.html.

The FWS is using the recommendations to develop voluntary guidelines for projects located within federal agency permitting jurisdictions and anticipates publishing the guidelines by December 2010 for public comment. State and local agencies may find the voluntary guidelines applicable to projects within their jurisdictions. Project developers are advised to consult the most current guidelines and coordinate early with state/local and federal agencies for prospective projects located within multiple jurisdictions. Specific state and federal guidelines may differ in approach to accommodate the respective policies and early coordination can help avoid, or address as expeditiously as possible, any differences.

Wind Energy Power Plant BMPs

BMPs for addressing biological resources, noise and vibration, shadow flicker and blade glint and visual resource issues specific to wind turbines are as follows. Consider these BMPs and the BMPs in **Chapter 3** for planning and operating wind energy power plants.

Biological Resources

- 1) Keep lighting at operation and maintenance facilities and substations located within 0.5 mile of the turbines to the minimum required for meeting FAA guidelines, and safety and security needs.
- 2) Locate turbines to avoid separating birds and bats from their daily roosting, feeding, or nesting sites if documented that the turbines' presence poses a risk to species.
- 3) Although it is unclear whether tubular or lattice towers pose less risk, it is recommended that tubular towers or best available technology be used to reduce bird perching opportunities on turbines.
- 4) Remove wind turbines when no longer cost effective to use or retrofit so they cannot present a collision hazard to birds and bats.

California Condor

The California condor is listed as endangered under the Federal Endangered Species Act and is also fully protected pursuant to Fish and Game Code, Section 3511. A project that results in the unauthorized take of a California condor will be subject to prosecution under State and Federal laws. Refer to the following websites for more information on the Federal and California Endangered Species Acts, the Fish and Game Code, information to assist in determining impacts from prospective projects, and protections specific to the California condor:

- <http://www.fws.gov/endangered/index.html>
- http://www.dfg.ca.gov/habcon/cesa/other_protects.html

Consultation with the FWS and DFG is strongly recommended prior to proposing wind projects within the existing and historical ranges of the condor. Project developers are advised that applications for wind projects proposed within the condor's ranges would likely receive intense review and possibly an extended permit review process. The review would include an analysis of the proposed project and viable alternative sites and technologies to ensure the project is consistent with the applicable California condor protections. If a project is proposed within the ranges, include in project applications design and operations standards that demonstrate the project would not result in the take of condors. Examples of such standards include non-lethal means of harvesting the wind energy or not operating turbines when condors are active.

Noise and Vibration

Wind turbines produce noise generated primarily from mechanical and aerodynamic sources. Mechanical noise may be generated by machinery in the nacelle (the structure on the wind turbine that encloses the generation equipment). Aerodynamic noise emanates from the movement of air around the turbine blades and tower. The types of aerodynamic noise may include low frequency, impulsive low frequency, tonal, and continuous broadband. Appropriate siting and turbine design may control and possibly prevent wind facility noise.

- 1) Site wind farms to avoid locations in close proximity to sensitive noise receptors (for example, residences, hospitals, and schools).
- 2) Adhere to applicable wind turbine national or international acoustic design standards (for example, International Energy Agency, International Electrotechnical Commission, and the American National Standards Institute).
- 3) Use variable speed turbines or pitched blades to lower rotational speed.

Shadow Flicker and Blade Glint

Shadow flicker occurs when the sun passes behind the wind turbine and casts a shadow. As the rotor blades rotate, shadows pass over the same point causing an effect termed shadow flicker. Shadow flicker may become a problem when residences are located near or have a specific orientation to the wind farm. Most problems occur generally southwest and southeast of the turbines.

Similar to shadow flicker, blade, or tower glint occurs when the sun strikes a rotor blade or the tower at a particular orientation. This can impact a community, as the reflection of sunlight off the rotor blade may be angled toward nearby residences. Blade glint is a temporary phenomenon for new turbines, only, and typically disappears when soil builds up on blades after a few months of operation.

Prevention and control measures to address these impacts include the following:

- 1) Use commercially available modeling software to identify a “zone” of flicker. Appropriately site and orient wind turbines to minimize shadow flicker occurrences on nearby residences.
- 2) Paint wind turbine towers with non-reflective coating.

Visual Resources

Depending on the location and local public perception, wind farms, like other power plants, may impact visual resources. Visual impacts associated with wind energy projects typically concern the turbines themselves (for example, color, height, and number of turbines) and impacts relating to their interaction with the character of the surrounding landscape. Carrying out the general visual resource BMPs and the following BMPs specific to wind energy power plants will minimize visual impacts.

- 1) Maintain uniform size and design of turbines (for example, direction of rotation, type of turbine and tower, and height).
- 2) Paint the turbines with a non-reflective coating and a uniform color, typically matching the sky (like pale blue), while observing air navigational marking regulations and addressing biological resource concerns.
- 3) Avoid lettering, company insignia, advertising, or graphics on the turbines.

Geothermal Energy Power Plant Guidance

The guidance recommended in **Chapters 2 and 3** is generally applicable to geothermal energy power plants. In addition, actions or items specific to geothermal power plant technology should be considered and carried out prior to providing applications to appropriate lead agencies.

- 1) In the application to construct a geothermal power plant on state owned or privately owned land, include information about the proposed locations and construction methodology for related development and injection wells.
- 2) In the application to construct a geothermal power plant, include information about the proposed routes and construction methodology for related steam-supply or brine pipelines.
- 3) Consider purchasing buffer areas, rights-of-way, and/or negotiating with public agencies to install road gates and address community, public access, noise, air quality, and other issues/concerns.
- 4) Site and locate drilling pads on the corners of agricultural fields and route pipelines along farm roads to minimize removal of agricultural land from production.

Geothermal Energy Power Plant BMPs

Agency Decisions and Permitting Guides

In December 2008, BLM approved a Programmatic EIS (PEIS), (Bureau of Land Management 2008a), and published a Record of Decision (Bureau of Land Management 2008b) to facilitate geothermal leasing in 12 Western states, including California. The decision opened specific acreage on BLM-managed land in the Mojave and Colorado Desert region to geothermal development by amending the following RMPs:

- Caliente RMP (Bakersfield Field Office)
- West Mojave RMP (Barstow Field Office)
- Bishop RMP (Bishop Field Office)
- East San Diego County RMP (El Centro Field Office)
- South Coast RMP (Palm Springs Field Office)

BLM amended each RMP to include geothermal BMPs, which were published in the Record of Decision as Appendix B (Bureau of Land Management 2008b). These BMPs are potential conditions of approval, which BLM field office staff would include in use authorizations for geothermal exploration, drilling, development, and reclamation activities.

In addition, BLM published environmental BMPs on its website (http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/technical_information.html#field%20guide) and in *The Surface Operating Standards and Guidelines for*

Oil and Gas Exploration and Development (Bureau of Land Management 2007) (commonly referred to as the Gold Book). Although these references were published as oil and gas industry guidance and standards, the mitigation measures for roads, transmission lines, pipelines, buildings, and screening are applicable guidance for developing and implementing geothermal resource power plant BMPs.

The Energy Commission approved the Salton Sea Unit #6 Power Project (Energy Commission 2003) with conditions of certification and published a geothermal resources permitting guide <http://www.energy.ca.gov/2007publications/CEC-500-2007-027/CEC-500-2007-027.PDF> (Blaydes & Associates 2007). Both documents provide examples of and explain in detail California requirements for developing geothermal wells and power plants.

BMPs

Geothermal project developers are advised to consult **Chapter 3** and incorporate the general BMPs applicable to their project and project site. The following BMPs are specific to geothermal projects and are recommended for project developer consideration. The BMPs below build on decisions and guides mentioned above in **Geothermal Energy Power Plants** in addition to *Environmental, Health and Safety Guidelines for Geothermal Power Development* (International Finance Corporation 2007a), recommended controls on hydrogen sulfide (H₂S) emissions (Nagl N/D), examples of waste discharge requirements (California Regional Water Quality Control Board, Colorado River Basin Region 2007), and injection well guidance (U.S. Environmental Protection Agency 1999).

Air Quality

The following air quality BMPs focus on recommendations to reduce H₂S and hazardous air pollutant emissions. USEPA does not classify H₂S as either a criteria air pollutant or a hazardous air pollutant. The State of California, however, adopted an Ambient Air Quality Standard for H₂S⁷ to protect public health and decrease odor annoyance. Air pollution control/management districts may have short-term, maximum (for example, hourly), and annual average standards for H₂S stationary sources, including geothermal power plants. For example, the Imperial County Air Pollution Control District in its rule 207 requires Best Available Control Technology be applied to stationary sources (such as geothermal power plants) with the potential to emit more than 55 pounds per day of H₂S (County of Imperial 1999).

- 1) Consider technological options that include total or partial gas and geothermal fluid reinjection.

⁷The State's ambient standard for H₂S is a 1-hour average of 0.03 parts per million (30 parts per billion), not to be equaled or exceeded.

- 2) When total reinjection is not possible, capture and treat geothermal steam, H₂S, and ammonia emissions if their release would violate state or local air quality standards.
- 3) If necessary, use abatement systems to remove H₂S and other regulated emissions from noncondensable gases. Examples of H₂S controls include wet or dry scrubber systems and liquid phase reduction/oxidation systems.
- 4) Develop a list of emission rate estimates for each relevant pollutant from each emission point source (such as well venting, drill rig diesel engines, fugitive dust, plant silencers, sulfur plant exhaust, cooling towers). Organize these estimates by project phase: well-field development (estimate number of wells to be drilled, vented each year); plant operations (estimate number of replacement wells to be drilled each year), and forced and planned outage rates.

Hazards and Waste Management

- 1) Assure that hazardous substances and wastes removed from surface impoundments do not leak, spill, or are otherwise improperly released outside surface impoundments and into the environment.
- 2) Remediate contamination near and around surface impoundments, including the tops of berms and areas downwind from the impoundments, filter cake bay storage areas, hydroblast pads and adjoining areas, areas containing or adjacent to pipes containing hazardous waste scale, and other areas where hazardous waste releases or disposals occur.
- 3) Minimize filter cake releases into the environment by enclosing filter cake bays with doors, replacing filter cake bays with containers or trailers capable of storing the waste material, and preventing releases during to/from the storage facilities.
- 4) Ensure that employees and contractors operating flash-steam plants receive appropriate high pressure high temperature training (HPHT) before working with hazardous waste. Such work activities include hazardous waste treatment, storage, and disposal at the facility or HPHT environments (wellsite, pipeline, and power plant operations).
- 5) Conduct biennial environmental audits to identify hazardous waste streams and determine compliance with applicable statutory and regulatory provisions of California's Hazardous Waste Control Law and the Unified Hazardous Waste and Hazardous Materials Management Regulatory Program. (Note: A facility's environmental audit program and audit results are not publicly disclosed.)
- 6) Clean fluid pipelines at intervals sufficient to prevent silica-scale buildup. Build-up could clog the pipelines and result in releases of silica scale and other materials.
- 7) For flash-steam plants, perform pipeline descaling operations only in areas designated for descaling. (Note: This BMP does not apply to binary plants.)

- 8) For Salton Sea-area geothermal power plants, construct hydro blasting areas so that the base is impermeable and no wastewater can spray or run onto adjacent soil. For example, build hydro blasting areas with 12-foot high walls on three sides. Convey hydro blasting process wastewater to the brine surface impoundment for reinjection to the geothermal resource.
- 9) Contain drilling muds and cuttings, when possible.

Induced Seismicity

- 1) Replenish the withdrawn fluids by injecting into wells located within the geothermal field.
- 2) Monitor injection pressure, micro-seismicity, and injection operations for detecting induced micro-seismicity.
- 3) If micro-seismicity starts occurring outside the geothermal field, reduce injection pressures, and possibly move the injection operation to a different field location.

Noise

BLM regulations seek to “minimize noise” but set no measurable standard. BLM relies on noise criteria published in 1975 by the U.S. Geological Survey in “Geothermal Resources Operational Order No. 4.” The order applies to people occupying nearby homes, hospitals, schools, and libraries, according to the 2008 PEIS and states that federal land lessees may:

“not exceed a noise level of 65 dB(A) for all geothermal-related activity including but not limited to, exploration, development, or production operations as measured at the lease boundary line or 0.8 km (one-half mile) from the source, whichever is greater, using the A-weighted network of a standard Sound Level Meter. However, the permissible noise level of 65 dB(A) may be exceeded under emergency conditions or with [regulatory] approval if written permission is first obtained by the lessee from all residents within 0.8 km (one-half mile).”

Geothermal resource exploration/testing involves well drilling and less invasive approaches such as geophysical remote sensing. Remote sensing can refine well targeting and reduce the number of wells drilled. The exploration/testing approach is generally identified in a reservoir management plan.

- 1) Locate the sites as far from residences as practical, considering the location of the geothermal resource. In addition, use terrain, such as ridges, and plan the drill site so that noise is shielded and projected away from residences, as much as possible. Use noise abatement techniques, such as placing hay bales around the location, to reduce drilling-related noise. Examples of noise-abatement equipment include temporary noise shields, cyclone silencers, rock wall mufflers, and sound insulation in pipes. Silencers slow the velocity of steam in the steam processing facility.

Soils and Drainage

Do not use geothermal fluids or exploratory well-drilling muds for dust control on access roads, well pads, or within the facility area.

Water Supply

Flash-steam geothermal power plants can satisfy some of their water supply needs by recycling steam condensed from produced geothermal brine. However, they require an external supply source for cooling tower make-up water (CE Obsidian Energy, LLC 2009).

Water-cooled binary power plants always require an external cooling water source because the brine remains within a closed-loop system until injected (County of Imperial, Department of Public Works N/D). As shown in **Appendix B, Figure 13** wet-cooled geothermal binary power plants have the highest water consumption rate per megawatt hour of any thermal power plant technology (over 1,600 gallons per megawatt hour, compared to less than 200 gallons per megawatt hour for gas combustion, combined cycle, dry-cooled concentrating solar, or geothermal binary-hybrid cooling).⁸ This information understates water consumption for certain binary plants; ORMAT reported in 2009 water consumption at Imperial Valley plants as averaging between 3,360 to 4,200 gallons per megawatt hour.

Binary plants in Northern Nevada use air-cooled condensers (that is, dry cooled) to reject heat and condense steam because water supplies are scarce and the region's ambient air temperatures allow the heat to be rejected efficiently. In the extreme Imperial Valley summer temperature conditions; however, air-cooled binary plants would be unable to reject waste heat without drastic reductions in electric power output.

- 1) For binary geothermal plants located:
 - a) In the Imperial Valley, minimize water use for power plant cooling by using hybrid (wet-dry) cooling technology. Use wet cooling only during extremely hot temperature conditions in summer. (Hybrid cooling technology has had limited application to date, but is commercially available.). Use a degraded or reclaimed water source for the wet-cooling portion of the hybrid cooling system's operation.
 - b) In other regions of the Southern California desert, minimize water use for power plant cooling by using dry-cooling technology. To improve plant performance and efficiency during hot summer temperature conditions, use a pre-cooling strategy (such as pre-cooling with spray nozzles capable of creating micron-sized water

⁸ "A Sustainable Path: Meeting Nevada's Energy and Water Needs, Western Resource Advocates, 2008, Page 24, <http://www.westernresourceadvocates.org/water/NVenergy-waterreport.pdf>

droplets or with honeycomb, porous evaporative cooling media). Use a degraded or reclaimed water source for the selected pre-cooling strategy.

Biomass Facility Guidance

Certain biomass facilities are eligible for the California RPS. In general, biomass combustion facilities are not, but non-combustion thermal (conversion) technologies are eligible. Refer to **Biomass MSW Conversion, Appendix B** for more detail on RPS eligibility. A few biomass facilities are expected to be proposed in the desert region. Due to this possibility, guidance and BMPs for such facilities are included in this manual. In general, the pre-application guidance recommended in **Chapters 2 and 3** are applicable to biomass facility applications.

The following guidance is specific to certain biomass projects and recommended in conjunction with the activities listed in earlier chapters of this manual. For municipal solid waste (MSW) conversion to energy power plants and biorefineries, feedstock storage is important to the biomass enterprise's overall feasibility. Storage may be on the same site as the feedstock source, alternatively, the necessary volumes can only be acquired by combining feedstock from a number of relatively close sources at an optimal, centralized location.

MSW Conversion to Energy Power Plants

- 1) Locate biomass power plants ideally within 25 miles of feedstock sources.
- 2) Consider use of combined heat and power (CHP or cogeneration) facilities, if feasible. Because they capture the energy of otherwise wasted heat, CHP facilities can achieve thermal efficiencies of 70 to 90 percent compared with 32 to 55 percent for conventional thermal power plants.
- 3) To conserve water resources, propose use of a closed circuit dry cooling system (for example, air cooled condenser). If use of dry cooling is infeasible, closed-cycle or recirculating cooling water systems (for example, natural or forced draft cooling tower) may be considered by regulatory agencies.
- 4) Design the facility to discourage use by birds and other wildlife.

Biorefineries

- 1) Design the biorefinery with flexibility to handle multiple feedstocks.
- 2) Locate the biorefinery in close proximity to primary feedstock(s) and near-efficient transportation to markets (such as rail). Try to locate a proposed project within a 25 to 50 mile radius of facilities that will provide two to three times the fuel needed for a project to ensure a sufficient and sustainable fuel supply, and to minimize environmental impacts from transportation. Fuels with low moisture content are preferred over fuels with high moisture content.

Biomass Facility BMPs

The BMPs recommended in **Chapter 3** and the following BMPs can assist biomass facility developers in reducing potential impacts. Major sources of information for the biomass facility related BMPs include Oregon Environmental Council (2009), U.S. Environmental Protection Agency (2004), and International Finance Corporation (2007b).

Air Quality

- 1) Prepare and implement a dust abatement plan that addresses operations, fugitive dust and emissions from the feedstock delivery, storage, and preparation. Consider the following practices in the plan:
 - a) Use loading and unloading equipment that minimizes the height of fuel drop to the stockpile, and also consider use of cyclone dust collectors in enclosed areas.
 - b) Use water spray systems in arid environments to reduce fugitive dust formation from solid fuel storage.
 - c) Use enclosed conveyors with well-designed conveyor transfer point extraction and filtration equipment.
- 2) Consider air quality impacts from fugitive dust and direct feedstock transport equipment emissions.
- 3) Conduct regular preventive maintenance to maintain equipment engine emission performance.

Efficiency and Reliability

Maximize use of fuels with low moisture content. Use International Standardization Organization standards and procedures for measuring the feedstock moisture content.

Safety, Health, and Nuisances

Use automated systems such as temperature gauges or carbon monoxide sensors in solid fuel storage areas to detect fires caused by self-ignition and to identify risk points.

Biorefineries: Specific BMPs

Waste and Emissions

- 1) Inventory and analyze solid and liquid waste for hazardous material contamination.
- 2) Measure methanol efficiency and reduce fugitive emissions.
- 3) Eliminate off gassing from solid and liquid waste products.

Water Supply and Quality

- 1) Maximize efficient water use by recycling water and using production processes that minimize water use.
- 2) Protect water quality by using ZLD wastewater technologies.

- 3) Discharge process water to municipal waste treatment facilities, when appropriate.

MSW Conversion to Energy Power Plants: Specific BMPs

Many of the following measures are excerpts from information provided by the International Finance Corporation – a World Bank Group – on MSW Incineration Facilities (International Finance Corporation 2008).

Air Quality

- 1) Interlock the waste charging system with the temperature monitoring and control system to prevent waste additions if the operating temperature falls below the required limits.
- 2) Implement maintenance and other procedures to minimize planned and unplanned shutdowns.
- 3) Avoid operating conditions in excess of those that are required for efficient destruction of the waste.
- 4) Use a boiler to convert the flue-gas energy for the production of steam/heat and/or electricity.
- 5) Use flue gas treatment systems for controlling acid gases, particulate matter, and other air pollutants.
- 6) Consider the application of waste-to-energy or anaerobic digestion technologies to help offset emissions associated with fossil fuel-based power generation.
- 7) Control dioxins and furans by extensive segregation to ensure complete plastics and other chlorinated compound removal.
- 8) For high performance dioxin removal, use an activated carbon packed column.

Hazardous Materials, Pesticides, and Waste Management

- 1) Manage bottom ash separately from fly ash and other flue gas treatment residues to avoid contamination of the bottom ash and help ensure its potential recovery.
- 2) Separate remaining ferrous and non-ferrous metals from bottom ash as much as possible, to help ensure metal recovery.
- 3) Treat bottom ash (for example, by screening and crushing) to the extent that is required to meet on-site use or receiving specifications at off-site treatment or disposal facilities (for example, to achieve metal and salt leachate local environmental compliance levels).
- 4) Manage bottom ash and residuals based on their classification as hazardous or non-hazardous materials. Handle hazardous ash as hazardous waste. Dispose non-hazardous ash at a MSW landfill or consider recycling options.
- 5) Spray herbicides on feedstock to discourage further decomposition of MSW.

Land Use

- 1) Avoid siting facilities in exposed, windy areas.
- 2) Provide perimeter planting, landscaping, or fences to shield from wind.
- 3) Contain waste by use of dozers and landfill compactors immediately after discharge from the vehicles delivering the waste.
- 4) Provide an emergency tipping area/foul weather cell for lightweight wastes such as paper.
- 5) Construct banks and berms immediately adjacent to the tipping area. Install strategically placed mobile catch fences close to the tipping area, on the nearest downwind crest, and/or fully enclose the tipping area within a mobile litter net system.
- 6) Install wind fencing upwind of the tipping area to reduce on-site wind speeds.
- 7) Temporarily close the facility to specific waste or vehicle types when weather conditions are adverse.

Water Supply and Quality

To prevent, minimize, and control water effluents, treat, as necessary, wastewater from flue gas treatment. For example, use filtration coagulation, heavy metal filtration, and neutralization technologies.

REFERENCES

- Avian Power Line Interaction Committee. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Edison Electric Institute, APLIC, and the California Energy Commission, Washington, D.C. and Sacramento, CA. 2006.
- Avian Power Line Interaction Committee and U.S. Fish and Wildlife Service. *Avian Protection Plan Guidelines*. For Edison Electric Institute and U.S. Department of Interior. April 2005.
<http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/APP/AVIAN%20PROTECTION%20PLAN%20FINAL%204%2019%2005.pdf>.
- Blaydes & Associates. *California Geothermal Energy Collaborative: Expanding California's Confirmed Geothermal Resources Base (and) Geothermal Permitting Guide*. California Energy Commission Publication No. 500-2007-027. April 2007.
<http://www.energy.ca.gov/2007publications/CEC-500-2007-027/CEC-500-2007-027.PDF>
- Bureau of Land Management. *Geothermal PEIS, Chapter 12: El Centro Field Office Analysis of Pending Lease Applications CACA 043965, CACA 046142*. 2008a.
http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS_REALTY_AND_RESOURCE_PROTECTION/energy/geothermal_eis/final_programmatic.Par.90382.File.dat/vol2_final_chap12.pdf
- Bureau of Land Management. *Record of Decision and Resource Management Plan Amendments for Geothermal Leasing in the Western United States*. December 2008b,
http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS_REALTY_AND_RESOURCE_PROTECTION/energy/geothermal_eis/final_programmatic.Par.90935.File.dat/ROD_Geothermal_12-17-08.pdf.
- Bureau of Land Management. *The Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (Fourth Addition)*. 2007.
http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS_REALTY_AND_RESOURCE_PROTECTION/energy/oil_and_gas.Par.18714.File.dat/OILgas.pdf
- California Burrowing Owl Consortium. *Burrowing Owl Survey Protocol and Mitigation Guidelines*. April 1993.
- California Department of Fish and Game. 1995. *Staff Report on Burrowing Owl Mitigation*. October 17, 1995.
- California Energy Commission. *Renewables Portfolio Standard Eligibility Third Edition*. CEC-300-20078-006-ED3-CMF. April 21, 2004. <http://www.energy.ca.gov/2007publications/CEC-300-2007-006/CEC-300-2007-006-ED3-CMF.PDF>
- California Energy Commission and California Department of Fish and Game. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Commission Final Report. California Energy Commission, Renewables Committee,

and Energy Facilities Siting Division, and California Department of Fish and Game, Resources Management and Policy Division. CEC-700-2007-008-CMF. October 2007. <http://www.energy.ca.gov/windguidelines/index.html>

California Energy Commission. *Commission Decision for the Salton Sea Unit #6 Power Project*. Publication No. 800-03-02. December 2003.

http://www.energy.ca.gov/sitingcases/saltonsea/documents/2003-12-19_COMISN_DECISION.PDF

California Regional Water Quality Control Board, Colorado River Basin Region. *Waste Discharge Requirements for Iceland America Energy LLC, Owner/Operator Truckhaven Geothermal Exploratory Well, Wellfield Mud Sump/Containment Basin, Truckhaven Geothermal Leasing Area - Imperial County*. Order No. R7-2007-0043.

http://www.swrcb.ca.gov/rwqcb7/board_decisions/adopted_orders/orders/2007/43_ice_land_wdr.pdf

California State Water Resources Control Board. *Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling*. Resolution 75-58. June 19, 1975.

CE Obsidian Energy, LLC. *Petition for Amendment - Salton Sea Unit 6 Geothermal Power Plant Major Amendment*. Section 2 Project Description. Filed March 13, 2009.

http://www.energy.ca.gov/sitingcases/saltonsea_amendment/documents/applicant/afcl/.

County of Imperial, Department of Public Works. *Water for Geothermal Development in Imperial County: A Summarizing Report*. U.S. Department of Energy Cooperative Agreement DE-FC03-79ET27196. N/D. <http://www.osti.gov/bridge/servlets/purl/6771087-shvNgn/native/6771087.pdf>

County of Imperial, Planning/Building Department. *Rules and Regulations to Implement CEQA, As Amended*. Page 22. July 26, 2000.

http://www.co.imperial.ca.us/planning/planning_div/ceqa/ceqarul2.pdf

County of Imperial. *Imperial County APCD Rule 207 New and Modified Stationary Source Review*. Revised September 14, 1999. <ftp://ftp.arb.ca.gov/carbis/nsr/sb288/rules/icapcd207.pdf>.

Desert Tortoise Council. *Guidelines for Handling Desert Tortoise during Construction Projects*. 1994.

Edison Electric Institute. *Mitigating Bird Collisions with Power Lines: the State of the Art in 1994*. Washington, DC. 2004.

International Finance Corporation (a World Bank Group), Environmental and Social Sustainability Department. *Environmental, Health and Safety Guidelines for Geothermal Power Development*. April 30, 2007a.

[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeothermalPowerGen/\\$FILE/Final+-+Geothermal+Power+Generation.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeothermalPowerGen/$FILE/Final+-+Geothermal+Power+Generation.pdf).

- International Finance Corporation (World Bank Group). *Environmental, Health, and Safety Guidelines for Thermal Power Plants*. December 19, 2008.
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_ThermalPower/\\$FILE/FINAL_Thermal+Power.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_ThermalPower/$FILE/FINAL_Thermal+Power.pdf)
- International Finance Corporation (World Bank Group). *Environmental, Health, and Safety Guidelines for Waste Management Facilities*. December 10, 2007b.
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_WasteManagement/\\$FILE/Final+-+Waste+Management+Facilities.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_WasteManagement/$FILE/Final+-+Waste+Management+Facilities.pdf)
- Kutscher, C. and D. Costenaro. *Assessment of Evaporative Cooling Enhancement Methods for Air-Cooled Geothermal Power Plants*. Conference Paper Preprint, presented at the Geothermal Resources Council (GRC) Annual Meeting in Reno, Nevada. September 22–25, 2002. August 2002. <http://www.nrel.gov/docs/fy02osti/32394.pdf>
- Nagl, Gary J. *Controlling H₂S Emissions in Geothermal Power Plants*. Gas Technology Products. N/D. http://www.gtp-merichem.com/support/technical_papers/geothermal_power_plants.php
- Oregon Environmental Council. *Best Management Practices for Biofuels*. Accessed July 15, 2009.
<http://www.oeonline.org/our-work/economy/biofuels4oregon>.
- Sanyal, Subir K., Eduardo E. Granados and Anthony J. Menzies. *Injection-Related Problems Encountered in Geothermal Projects and Their Mitigation: The United States Experience*, GeothermEx, Inc. 1995. http://www.geothermex.com/files/Sanyal_1995-1.pdf.
- U. S. Environmental Protection Agency, Office of Research and Development Washington, DC, 20460. *The Use of Best Management Practices (BMPs) in Urban Watersheds*. EPA/600/R-04/184. September 2004.
<http://www.epa.gov/nrmrl/pubs/600r04184/600r04184.pdf>
- U.S. Environmental Protection Agency. *The Class V Underground Injection Control Study*. Electric Power Geothermal Injection Wells, Volume 17. September 1999.
http://www.epa.gov/ogwdw/uic/class5/pdf/study_uic-class5_classvstudy_volume17-geothermalelectricpower.pdf.
- U.S. Fish and Wildlife Service. *Desert Tortoise Exclusion Fence Specifications*. 2005.
- U.S. Fish and Wildlife Service. *Draft Revised Recovery Plan for the Mojave Population of the Desert Tortoise (Gopherus Agassizii)*. California and Nevada Region, Sacramento, California. 2008.
- U.S. Fish and Wildlife Service. *National Bald Eagle Management Guidelines*. May 2007.
- Western Resource Advocates. *A Sustainable Energy Path: Meeting Nevada's Water and Energy Demand*. Page 25. 2008.
<http://www.westernresourceadvocates.org/water/NV%20energy-water%20report.pdf>

GLOSSARY AND ACRONYMS

Glossary

AERMOD. An air dispersion model preferred or recommended for use by USEPA.

ASTM. ASTM International Standards Worldwide, formerly known as American Society for Testing and Materials. ASTM developed standards (acceptable to California regulators) for conducting hazardous waste site assessments.

Best management practices. Suggested practices (or combination of practices) that are determined to provide the most effective, environmentally sound, and economically feasible means of managing a project or facility and addressing the impacts. The practices do not supplant agency regulatory requirements and are suggestions to be used at the discretion of agencies and project developers.

CFR. Code of Federal Regulations002E

Construction. The period during which a renewable energy project, including transmission lines, roads, and other related facilities, is being constructed.

dBa. A weighted decibels (used frequently in noise analyses).

Decommissioning/abandonment. This project phase is the cessation of power generation operations and removal of all associated equipment, roads, and other infrastructure. The land is then abandoned, restored, or used in other ways.

Guidance. To be considered for developing a prospective renewable energy project and preparing and reviewing a permit application. Guidance does not supplant agency regulations, laws, ordinances, rules, or standards and are suggestions to be used at the discretion of agencies and project developers.

H₂S. The chemical hydrogen sulfide.

Operation. The project phase during which the renewable energy facility is generating electricity transmitted on the inter and intra state transmission grid or producing and distributing biofuels for customer use.

Permitting and pre-construction. The project development phase after applications have been accepted by the lead agencies and includes the project environmental assessment and decision-making process. Project design or redesign may also occur. The phase may also include the time after a project has been approved and project developers are completing measures required by agencies before construction.

Post-application. Project phases including permitting, pre-construction, operation, repowering/retrofitting, decommissioning/abandonment.

Pre-application. The project development phase prior to acceptance of AFC, ROW, and other permit applications as complete by the applicable lead federal, state, and local agencies. Includes initiation of agency and stakeholder consultations, and much of the project design phase.

Repowering. Repowering refers to modernizing an existing power plant by removing old electrical generation equipment and replacing it with new equipment that is generally more efficient than the old equipment. Repowering may require new permits/approvals or amendments to existing permits/approvals.

Retrofitting. Retrofitting is defined as replacing portions of existing electrical generating equipment or other project facilities so that part of the original turbines, electrical infrastructure, or foundation continued to be used. New permits/approvals or amendments to existing permits/approvals may be required.

SCREEN. Screening tool models often applied before using a refined air quality model (such as AERMOD) to determine if refined modeling is needed.

Special status species. Plants and wildlife that are legally protected under the federal Endangered Species Act and California Endangered Species Act, or other regulations, and species that are considered sufficiently rare by the scientific community to qualify for such listing.

THWELLS. Readily adaptable modeling code for evaluating drawdown from single and multiple pumping wells.

U.S.C. United States Code.

Acronyms

ACOE	Army Corps of Engineers
AFC	Application for Certification
APE	Area of potential effect
APLIC	Avian Powerline Interaction Committee
BA	Biological assessment
Biorefineries	Biofuel refineries
BLM	U.S. Bureau of Land Management
BMP	Best management practice
California ISO	California Independent System Operator

California Guidelines	<i>California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development</i>
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CHP	Combined heat and power
CPUC	California Public Utilities Commission
CPV	Concentrated photovoltaic
CRHR	California Register of Historical Resources
CRMMP	Cultural Resources Monitoring and Mitigation Plan
CSP	Concentrating solar power
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
DFG	California Department of Fish and Game
DOD	Department of Defense
DOGGR	California Department of Conservation, Division of Oil, Gas and Geothermal Resources
DPR	California Department of Parks and Recreation
DRECP	Desert Renewable Energy Conservation Plan
EIS	Environmental impact statement
EMI	Electromagnetic interference
Energy Commission	California Energy Commission
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FWS	U.S. Fish and Wildlife Service
HPHT	High pressure high temperature
ITP	Incidental Take Permit
LAFCo	Local Agency Formation Commission
LSAA	Lake or Streambed Alteration Agreement

MOA	Memorandum of agreement
MOU	Memorandum of understanding
MSW	Municipal solid waste
NEPA	National Environmental Protection Act
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
PA	Programmatic Agreement
PEIS	Programmatic environmental impact statement
PV	Photovoltaic
REAT	Renewable Energy Action Team
RMP	Resource management plan
ROW	Right-of-way
RPS	Renewables Portfolio Standard
RWQCB	Regional Water Quality Control Board
SLC	California State Lands Commission
SWPPP	Stormwater pollution prevention plan
SWRCB	State Water Resources Control Board
USEPA	United States Environmental Protection Agency
WEAP	Worker environmental awareness program
ZLD	Zero liquid discharge

APPENDIX A: Regulatory Framework

The renewable energy facility regulatory framework and structure in California is complex. California and the federal government are working toward creating a more efficient process for timely permitting of renewable energy facilities located in the California desert region. The agencies with the main responsibility for designing an accelerated process and that are part of the regulatory framework are: The U.S. Department of Interior Bureau of Land Management (BLM) and Fish and Wildlife Service (FWS), California Energy Commission (Energy Commission), and Department of Fish and Game (DFG). These entities are the Renewable Energy Action Team (REAT) management agencies and their specific roles are described below. Major REAT permitting improvement efforts to date include increased coordination and cooperation to: compress permitting schedules, develop a desert region comprehensive conservation strategy, use consistent approaches (as much as possible) when addressing common regulatory issues, conduct concurrent or joint project reviews, and establish funds to expedite projects and enhance conservation opportunities. The framework also includes the California Department of Conservation Division of Oil, Gas, and Geothermal Resources (DOGGR), California State Lands Commission (SLC), California Public Utilities Commission (CPUC), Department of Defense (DOD), local governments, tribal governments, and other federal, state, and regional jurisdictions. **Table A**, at the end of **Appendix A**, summarizes federal, state, and local government agency authorities and authorizations.

The involvement of any of nearly 30 federal and state agencies, in addition to tribes, cities, counties, and special districts, in the renewable energy regulatory decision-making process depends on the type of facility or technology proposed, project location, and the significance of effects on the environment and human health and safety. As examples:

- A. Thermal electric generating power plants 50 megawatts or larger in size:** The Energy Commission has exclusive power to certify such plants and related facilities for the State of California in lieu of state, regional, and local agencies. Under the California Environmental Quality Act (CEQA), the Energy Commission is the lead state agency. If a project triggers federal agency review the federal lead agency (under the National Environmental Policy Act [NEPA]) varies depending on facility location and required federal permits. Generally, either BLM, the U.S. Environmental Protection Agency (USEPA), a federally recognized tribe, DOD, or U.S. Army Corps of Engineers (ACOE) would be the federal lead agency. Often, the Energy Commission and federal lead agency will prepare a joint environmental document. Whether one or two environmental documents are prepared, the Energy Commission and the federal lead agency would consult with DFG, FWS, local governments, and other agencies to ensure environmental and health/safety issues are addressed. A few local or state agencies that administer federal laws may issue the federal permits.

- B. Thermal electric generating power plants less than 50 megawatts in size, solar photovoltaic, and other non-thermal power plants, such as wind farms:** California lead agency status (under CEQA) would depend on project location and required state and/or local approvals. On state-managed lands, likely the SLC would be the lead agency. On private lands, the most likely state lead agency would be a local jurisdiction. The federal lead would vary, as discussed above. Either joint or separate CEQA/NEPA documents are prepared. The CEQA Guidelines encourage preparation of joint documents when state and federal permits are required. The lead agencies would consult with state trustee and responsible agencies (under CEQA) and federal cooperating agencies (under NEPA) during environmental review. Many of the trustee, responsible, and cooperating agencies identified would issue their required permits after the state environmental document is certified by the state lead agency and the record of decision on the federal environmental document is issued by the federal lead agency.
- C. Geothermal power plants:** For power plants 50 megawatts or greater in size, the Energy Commission is the state lead agency for the power plant and auxiliary facilities such as water pipelines, transmission lines, waste storage and disposal facilities, switchyards, and cooling towers. For plants less than 50 megawatts in size California lead agency status (under CEQA) would depend on project location and required state and/or local approvals.

Local governments, in general, have authority for siting related geothermal facilities on privately owned land, including development and production wells, geothermal resource conveyance lines, and other equipment related to geothermal field development. DOGGR has permitting authority for geothermal injection wells through an agreement with USEPA. DOGGR also has permitting authority for exploratory well drilling on state owned and private lands. The agency delegated its exploratory geothermal well-drilling authority to Imperial County for wells drilled in that county. SLC issues leases for geothermal power plants on state owned lands. The Regional Water Quality Control Boards and Department of Toxic Substance Control share responsibility for regulating management of hazardous wastes. The local air district issues air pollution permits and other agencies may be responsible for addressing other aspects of projects, including transmission and protection of environmental, cultural, and economic resources.

If a federal permit is required for the facility, the federal lead agency will vary depending on the required permit(s) and location of the plant. On many federally managed lands, BLM is the federal lead agency and leases its lands for geothermal well and power plant development.

- D. Biomass:** For thermal electric power plants, the state lead agency would be determined by the size (less than 50 megawatts: state lead agency would vary depending on land use permitting authority; 50 megawatts or greater: Energy Commission). The federal lead agency would vary, depending on required federal permits and location. The Energy Commission is not responsible for permitting biofuel refineries (biorefineries), digester, or biogas facilities. Therefore the state lead agency for such facilities would depend on required state permits and location. Agencies regulating impacts on sensitive plant and wildlife species, health/safety, air and water quality, pipeline safety, surrounding communities, and public service facilities would also issue permits.
- E. Electricity transmission facilities:** California's transmission and distribution system is another critical electricity system component. The Energy Commission issues permits for project-related substations and transmission lines between the power plants under its regulatory jurisdiction and the first point of interconnection with the intrastate or interstate electrical grid. Prior to permitting a transmission line, the California Independent System Operator (California ISO) or other appropriate control agency, such as a publically owned utility, approves an electric transmission interconnection study to identify and address mitigation of adverse impacts on the electrical grid. For transmission lines 200 kilovolts (kV) and larger owned by investor owned utilities (IOU), like Southern California Edison, the CPUC issues Certificates of Public Convenience and Necessity. If the IOU proposes a transmission line between 50 kV and 200 kV, the CPUC issues a Permit to Construct. Publically owned utilities, like the Los Angeles Department of Water and Power, permit and regulate use of their systems. Federal transmission agencies like the Western Area Power Administration are responsible for planning and permitting their own transmission lines.

Renewable Energy Action Team Management Agencies

California Governor Arnold Schwarzenegger's Executive Order S-14-08 and U.S. Department of Interior Ken Salazar's Secretarial Order 3285 direct the REAT agencies to expedite and encourage timely and responsible development of RPS eligible renewable energy resources while minimizing environmental impacts and protecting and enhancing water, wildlife, and other natural resources. Provided below are brief REAT agency descriptions. Following the descriptions are summaries of recently enacted legislation and the memoranda signed by the REAT agencies to carry-out the orders.

BLM - <http://www.blm.gov/wo/st/en/prog/energy.html> - Laws that generally govern BLM actions include:

- Mineral Leasing Act
- Federal Land Policy and Management Act

- Energy Policy Act
- NEPA

BLM grants rights-of-way (ROW) to construct and operate facilities such as renewable energy power plants and biorefineries. BLM also issues leases for geothermal energy production, including drilling of the wells, and manages the subsurface activities on BLM-managed, U.S. Forest Service-administered, and military lands in the Mojave and Colorado Desert regions. Before granting a ROW or issuing a lease, BLM must perform a NEPA review, which considers the project's potential environmental impacts and identifies feasible mitigation measures.

FWS – <http://www.fws.gov> – Generally the laws that govern FWS activities and actions include:

- Fish and Wildlife Coordination Act
- Migratory Bird Treaty Act
- NEPA
- Federal Endangered Species Act (FESA)

These laws and authorities (see **Table A**) protect certain federally designated special-status plant and wildlife species which proponents are advised to consider when planning projects. Generally the federally protected species are:

- Listed as threatened and endangered under FESA
- Proposed and candidates for listing under FESA
- Migratory Birds

FWS provides technical and biological information for use in the NEPA review and document preparation process. Through these efforts, FWS seeks to ensure that impacts to fish and wildlife resources are adequately described and that mitigation needs are met. FWS advises the ACOE and USEPA in their efforts to regulate the discharge of dredged or fill material into waters of the United States. FESA requires FWS to assist other federal agencies in ensuring that actions they authorize, implement, or fund will not jeopardize the continued existence of federally endangered or threatened plant or wildlife species. It issues permits for take of federally protected species to federal and non-federal entities. Applications for incidental take permits must include habitat conservation plans (HCPs) which describe anticipated effects of proposed taking of federally protected species and possibly other special status species, how impacts will be minimized or mitigated, and how HCP actions will be funded. FWS may coordinate preparation of a HCP with DFG (see below). FWS assesses activities proposed on

national wildlife refuges for compatibility with the refuge system mission and refuge purpose(s).

DFG – <http://www.dfg.ca.gov/about/resource-mgmt.html> – Generally the laws and regulations that govern DFG activities and actions are:

- California Native Plant Protection Act
- California Fish and Game Code
- CEQA
- California Endangered Species Act (CESA)

These laws, regulations, and authorities (see **Table A**) protect certain California designated special-status plant and wildlife species. Generally the state protected species are:

- Listed as threatened and endangered under CESA.
- CESA candidates.
- California species of special concern.
- Species that meet the definition of rare, threatened, or endangered in the California CEQA Guidelines. Species are often identified as plants on the California Native Plant Society's Lists 1A, 1B, and 2 and, in some cases, on Lists 3 and 4.
- Listed as rare in the Native Plant Protection Act.
- Fully protected species under the California Fish and Game Code.

DFG is the CEQA fish and wildlife resources trustee and responsible agency and is consulted by the CEQA lead agencies and Energy Commission during environmental document preparation. DFG reviews CEQA documents for adequacy of the analyses addressing potentially significant fish and wildlife resource impacts and recommends mitigation measures where necessary and appropriate. DFG generally has statutory and regulatory responsibility over state-listed rare, threatened, and endangered species and issues incidental take permits. DFG issues the permits when take of threatened and endangered species cannot be avoided through CEQA document consultations. DFG enters into formal agreements with project proponents to protect rare species.

DFG generally has statutory responsibility to protect lakes and streambeds. For projects that cross permanent, intermittent, or ephemeral waterways streambeds, banks or channels, DFG recommends implementation of techniques that avoid or minimize waterway alterations. The recommendations are contained in lake or streambed alteration agreements (LSAAs).

DFG develops natural community conservation plans (NCCPs), as authorized by the Natural Communities Conservation Plan Act. NCCPs identify and provide for regional or areawide plant, wildlife, and related habitat protections, while allowing compatible and appropriate economic activity. When appropriate, DFG will coordinate with federal fish and wildlife agencies in preparing joint state NCCP/HCPs. The Desert Renewable Energy Conservation Planning (DRECP) effort currently underway is an example of such a joint activity.

Energy Commission - <http://www.energy.ca.gov/33by2020/index.html> - The Energy Commission regulatory authorities are contained mainly in:

- Warren-Alquist Act
- CEQA

The State of California delegated authority to the Energy Commission to conduct environmental reviews for and license thermal power plants (and appurtenant facilities) that are 50 megawatts or greater in net generating capacity. For such projects, the Commission's certificate is in lieu of DFG incidental take permits, LSAAs, and permits or approvals, generally required by other state, local, or regional agencies. The Commission consults with these agencies to address their issues and concerns. The Secretary for Natural Resources determined the power plant siting process to be functionally equivalent to the CEQA environmental review process.

Recent Legislation and Memoranda of Understanding/Agreement

Federal and state agencies have supported recently enacted legislation and signed several memoranda to further Executive Order S-14-08 and Secretary Order 3285 implementation in a cooperative, collaborative, and timely manner. The legislation and memoranda document or clarify agency roles concerning regulation of desert renewable energy projects. Generally, the policies direct the agencies to expedite and make their regulatory processes more efficient while enhancing and maximizing environmental protection.

In March 2010 California legislation (SBX8 34 - Padilla) was enacted to facilitate DRECP area solar energy project development that qualifies for federal stimulus funds by, among other actions:

- allowing project developers to pay additional fees to expedite the Energy Commission environmental review and certification process,
- establishing a Renewable Energy Development Fee Trust Fund to accept developer in-lieu fees for mitigating impacts on protected plant and wildlife resources, and
- loaning \$10 million to DFG to purchase mitigation lands or conservation easements and cover associated costs of restoring, monitoring and acquiring the lands.

The most recent renewable energy related memorandum was executed in April 2010 by the REAT agencies and the National Fish and Wildlife Foundation. The memorandum of agreement (MOA) establishes a REAT mitigation account that may be used, in combination with the Renewable Energy Development Fee Trust Fund, by project developers to deposit funds for financing renewable energy project fish, wildlife, plant, and related habitat impact mitigation required in project permit decision documents. The account can be used to support renewable energy projects in the California Mojave and Colorado Desert region and is designed to more efficiently carry-out mitigation and maximize overall conservation benefits from the mitigation actions. Use of the account will a) expedite projects because developers can pay into the account rather than individually implementing mitigation actions and b) offer a wide range of mitigation measures, such as acquisition of contiguous blocks of quality wildlife habitat for wildlife connectivity and climate change adaptation.

The REAT account and the Trust Fund monies are similar in that renewable energy project proponents pay into accounts set up to receive project-specific mitigation funds, and a third party implements the mitigation actions. While the recently enacted legislation was limited to certain solar energy projects, the REAT account can be used for desert renewable energy projects, in general.

The State of California and U.S. Department of Interior executed a memorandum of understanding (MOU) on October 12, 2009 which establishes a Renewable Energy Policy Group to oversee MOU implementation. The document establishes or refines schedules for prioritizing agency permitting resources, processing solar development applications, developing a DRECP and initial conservation strategy, completing best management practices (BMPs) and other appropriate interim guidelines, and identifying and designating transmission corridors.

Energy Commission, DFG, BLM, and FWS executed a MOU on November 17, 2008, and officially formed their cooperative relationship. The purpose of the MOU is to 1) promote coordination between the agencies to develop guidance and a comprehensive conservation strategy (DRECP), 2) help reduce regulatory timelines for siting, development, permitting, and construction of qualifying Renewables Portfolio Standard (RPS) projects in the Mojave and Colorado Desert region, and 3) enhance and maximize environmental protections. One of the MOU objectives is to develop BMPs and other appropriate interim guidance to a) assist solar and other qualified RPS energy developers with siting projects in environmentally suitable locations, b) guide project development and construction, and c) to avoid and minimize environmental impacts.

The two MOUs discussed above direct REAT agency staff to meet weekly and discuss operations related to their renewable energy responsibilities. Agency staff also meet bimonthly with project developers.

The Energy Commission and DFG signed another MOU on November 17, 2008 to 1) establish and guide their REAT participation and 2) create a more efficient process for permitting renewable energy generation power plants and transmission lines under California law. They agreed to develop and publish a BMP manual to assist project applicants in designing RPS desert projects, considering agency siting issues and minimizing environmental impacts.

BLM and DOD executed in July 2008 a wind energy protocol to improve communication and coordination between the two agencies during review of proposed wind energy ROW applications on BLM administered public lands. The protocol established a process for DOD wind energy application review and comments. It provides a process for developing mitigation measures to minimize impacts on military activities and increase wind energy developer opportunities in the western United States.

The Energy Commission and BLM executed a MOU in 2007 that documents their relative roles, responsibilities, and procedures to follow in conducting joint environmental reviews of solar thermal power plant projects. The MOU also describes how they resolve disputes. For power plants under the Energy Commission's jurisdiction and that are proposed on federally managed land, the BLM and Energy Commission may prepare joint federal and state environmental impact documents before granting a ROW and issuing a certificate, lease, and license.

The Energy Commission and SLC, <http://www.slc.ca.gov/>, executed a MOA in October/November 2009. The MOA ensures timely and effective coordination between the two state agencies during the Energy Commission's Application for Certification (AFC) review of projects on SLC jurisdictional lands (SLC lands) and during SLC lease issuance for power plants not subject to the Energy Commission's jurisdiction. Generally, the non-jurisdictional power plants include those that are smaller than 50 megawatts, solar photovoltaic power plants, and wind energy projects of any size. SLC issues leases for renewable energy facilities and other types of development on state-owned lands under its jurisdiction. The SLC generally conducts a California CEQA review before issuing the lease or a geothermal prospecting permit for wells on SLC lands. The MOA describes the manner in which the two Commissions and their staffs will coordinate during AFC reviews and during consultation on power plant proposals requiring a SLC lease, but are not under the jurisdiction of the Energy Commission.

For plants under the Energy Commission's jurisdiction that are proposed on SLC lands and for which a SLC decision is required, SLC will use the Energy Commission-prepared environmental document in the same manner it would use another CEQA lead agency document, unless a subsequent or supplemental document is appropriate. If the Energy Commission document does not meet CEQA guidelines criteria, SLC will act as a lead agency and prepare the appropriate environmental document. Energy Commission staff will consult

with and provide advice to SLC staff on siting and compliance issues related to power plants outside the Energy Commission's jurisdiction for which SLC has regulatory responsibility.

Other Policies and Agencies

DOGGR, <http://www.conservation.ca.gov/dog/geothermal/Pages/index.aspx>, regulates how exploratory and injection geothermal wells are drilled, operated, maintained, and abandoned on non-federal and non-tribal lands. The Department of Conservation is proposing new regulations for geothermal well drilling, production, and injection operations in California. The regulations will address well spacing, casing requirements, blowout prevention, environmental protection, injection, subsidence, and plugging and abandonment. Proposed regulations can be accessed at ftp://ftp.consrv.ca.gov/pub/oil/geothermal/New_Geothermal_Regs.pdf.

The CPUC, <http://www.cpuc.ca.gov/PUC/energy>, permits certain renewable energy power plant, system, and transmission line infrastructure projects. The CPUC reviews permit applications from investor-owned utilities under two concurrent processes: 1) an environmental review consistent with CEQA and 2) review of project need and costs (Certification of Public Necessity and Convenience or Permit to Construct). It also approves IOU procurement contracts for electricity generated by renewable energy resources.

In coordination with the Federal Railroad Administration, the CPUC ensures railroads comply with federal railroad safety regulations. The CPUC investigates railroad accidents and responds to safety related inquiries made by community officials, the public, and railroad labor organizations.

The California ISO, <http://www.caiso.com>, is a nonprofit public benefit corporation charged with operating the majority of California's high voltage wholesale power grid. It is the link between power plants and utilities that serve more than 30 million consumers. California ISO provides qualified users equal access to the grid and strategically plans for electricity transmission infrastructure.

In the desert region many renewable energy facilities will be sited near or adjacent to DOD military installations or under aircraft low fly zones. The BLM, other agencies, and project proponents generally consult with the appropriate military representatives. Additionally, the Energy Commission will recommend a joint NEPA/CEQA environmental review process when a proposed power plant falls under the jurisdiction of the Commission and DOD.

Local Jurisdictions

Cities, counties, and special districts conduct CEQA environmental impact and mitigation analyses before permitting power plants smaller than 50 megawatt, solar photovoltaic power plants, wind energy projects of any size, development and production geothermal wells, and

many biomass facilities on privately owned or locally managed land. As lead agencies they use the environmental documents during their local permitting and regulatory processes.

Local agencies generally follow their general plans and zoning ordinances when making decisions on proposed projects. The general plans and ordinances generally address land and water use, transportation, conservation, open space, greenhouse gas impacts, safety, and noise.

Optional issues that may be addressed in general plans include energy or specific types of energy development. County governments may have an adopted geothermal element. These elements generally consist of a statement of geothermal development policies, including a diagram or diagrams and text setting forth objectives, principles, standards, and plan proposals. The content includes a discussion of environmental damages and identification of sensitive environmental areas, including unique wildlife habitat, scenic, residential, and recreational areas. Local governments, like Imperial County, may require that project developers consider how noise levels from energy facilities would affect wildlife, as well as humans.

Local governments may also assume responsibility delegated by a state regulatory agency. For example, DOGGR delegated its exploratory geothermal well-permitting authority to Imperial County (County of Imperial, Planning/Building Department 2000), http://www.co.imperial.ca.us/planning/planning_div/ceqa/ceqarul2.pdf, for such wells drilled in the county's jurisdiction. Imperial County has a CEQA categorical exemption for installing and operating geothermal temperature gradient wells for locating geothermal resources.

Table A: Renewable Energy Facility Authorizations – Summarized

Permits/Licenses/Consultations/Leases/Agreements/ Certifications		
Federal/Native American Nations	State/Regional	Local
<p>Advisory Council on Historic Preservation -Impacts on Listed, Historic Structures (National Historic Preservation Act)</p> <p>Army Corps of Engineers -Section 10 (Rivers & Harbors Act) -Section 404 (Clean Water Act) -Nationwide (Clean Water Act)</p> <p>Bureau of Indian Affairs -Government-to-Government Consultations with Indian Tribes (Tribal Treaties) -Government-to-Government Consultations with Indian Tribes (Tribal Treaties)</p> <p>Bureau of Land Management -Right-of-Way (Mineral Leasing Act, Section 28; Federal Land Policy & Management Act, Title V; Energy Policy Act, Section 211) -Land Leases (Federal Land Policy & Management Act of 1976; Energy Policy Act, Sections 222, 225)</p> <p>Department of Defense -Consultations with regulatory agencies & project developers (Energy Policy Act; National Environmental Policy Act)</p>	<p>Air Quality Management Districts (35) -New Source Review (Clean Air Act; CA Health & Safety Code, Division 26; CA Public Resource Code, Division 13, Local Agencies)</p> <p>Air Resources Board -Statewide Portable Equipment Registrations Program (Clean Air Act; CA Health & Safety Code)</p> <p>Caltrans -Encroachment (Streets & Highway Code)</p> <p>Department of Conservation, Division of Oil, Gas, and Geothermal Resources - Geothermal well drilling (CA Public Resources Code, Division 3, Chapter 4) -Lead agency – exploratory drilling projects on private & state lands (CA Public Resources Code 3715.5; CA Environmental Quality Act)</p> <p>Department of Fish & Game -Incidental Take (CA Endangered Species Act; CA Fish & Game Code 2080.1, 2081(b); CA Code of Regulations 873.0 et seq.) -Threatened & Endangered Species (CA Endangered Species Act; CA Environmental Quality Act and Guidelines, CA Code of Regulations 15000 et seq); -Rare plant agreements (California Native Plant Protection Act) -Lake or Streambed Alteration Agreement (CA Fish & Game Code 1600 et seq) -Natural Community Conservation Plan Permit (Natural Community Conservation Planning Act)</p>	<p>Airports -Encroachment (CA Public Resources Code, Division 9) -See Cities/Counties, above -Land Use (CA Coastal Act)</p> <p>Bureaus of Sanitation -Industrial Wastewater Discharge</p> <p>Cities/Counties (CA Government Code) -Encroachment -Land Use -Safety -Grading -Plumbing -Electrical -Public Works -Noise -Environmental Health -Building -Hazardous Substances Spill Response Plans (40 CFR 300) -Land Use (CA Public Resources Code, Division 6)</p>

<p>Department of Transportation -Hazardous Liquid Pipeline Special Permits (Hazardous Liquid Pipeline Safety Act of 1979, as amended) -Hazardous Liquid Pipeline Approvals (Hazardous Liquid Pipeline Safety Act of 1979, as amended)</p> <p>Environmental Protection Agency -National Pollutant Discharge Elimination System (Clean Water Act) -New Source Review (Clean Air Act)</p> <p>Federal Aviation Administration -Proposed Construction or Alteration of Objects That May Affect Navigable Airspace</p> <p>Federal Energy Regulatory Commission - Transmission lines in national corridors (Energy Policy Act)</p> <p>Fish & Wildlife Service -Use in national wildlife refuges (Fish & Wildlife Coordination Act) -Threatened & Endangered Species, Migratory Birds, Water Resources & Quality (Endangered Species Act; Migratory Bird Treaty Act; Fish & Wildlife Coordination Act) -Incidental Take permit (Endangered Species Act)</p> <p>Forest Service -Special Use Authorizations (Mineral Leasing Act, Section 28)</p>	<p>Department of Toxic Substance Control -On-site Hazardous Waste Generation (Resource Conservation & Recovery Act; Hazardous Waste Control Law)</p> <p>Energy Commission -Thermal Power Plant Certification (Warren-Alquist Act)</p> <p>Independent System Operator -Electric Transmission Interconnection Study Approvals (Federal Power Act, Section 205; Federal Energy Regulatory Commission regulations Section 35.13; CA Public Utilities Act)</p> <p>Lead Agency -Certification (CA Environmental Quality Act and Guidelines, CA Code of Regulations 15000 et seq)</p> <p>Occupational Safety & Health Administration [Cal OSHA] -Construction related (29 CFR 910.95)</p> <p>Public Utilities Commission -Permit to Construct (Public Utilities Code 1001 to 1013; CA Environmental Quality Act and Guidelines, CA Code of Regulations 15000 et seq) -Tariffs & Terms of Service (CA Public Utilities Code) -Certification of Public Necessity & Convenience (Public Utilities Code 1001 to 1013; CA Environmental Quality Act and Guidelines)</p> <p>Regional Water Quality Control Boards (9) -National Pollutant Discharge Elimination System (Clean Water Act; CA Porter Cologne Water Quality Control Act; CA Water Code Section 13000 et seq.) -401 Certification (Clean Water Act)</p> <p>State Fire Marshal, Office of Pipeline Safety (U.S. Department of Transportation Agent) -Design of leak protection system</p>	<p>Fire Departments -Hazmat (CA Constitution, Article XI, Section 7) -Above Ground Storage of</p> <p>Hazardous/Flammable Materials -Hazardous Materials Business Plan</p> <p>Local (general) -Natural Community Conservation Plan Adoption (Natural Community Conservation Planning Act)</p> <p>Lead Agency -Certification (CA Environmental Quality Act and Guidelines, CA Code of Regulations 15000 et seq)</p> <p>Resource Conservation Districts -Assistance for controlling soil, erosion/runoff, stabilizing soils & improving water quality (CA Public Resources Code)</p>
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<p>Lead Agency -Record of Decision (National Environmental Policy Act)</p> <p>National Park Service -Right-of-Way (The Organic Act)</p> <p>Native American Tribal Governments -Analogous to many Federal environmental permits (Tribal Treaties)</p> <p>Native American Tribal Monitors -Consistency with National Historic Preservation Act</p>	<p>-Cathodic protection -Pipeline Wellhead Protection</p> <p>State Historic Preservation Officer -Section 106 (National Historic Preservation Act)</p> <p>State Lands Commission -Land Lease (CA Public Resources Code, Division 6)</p>	<p>Special Districts – Examples: Water, Flood Control, Irrigation Districts -Encroachment (esp. for water crossings) (CA Public Resources Code, Division 9)</p>
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Source: California Energy Commission, 2009

APPENDIX B: Desert Renewable Energy Facility Technologies

In the desert region, the renewable energy resources of interest include solar, wind, geothermal, and biomass. Utility-scale renewable energy projects include facilities that collect the energy source and convert it into electricity and the appurtenant facilities like cooling systems (for thermal electric generating facilities), access roads, pipelines, and transmission lines. These facilities differ in design depending on the type of proposed renewable energy resource and the electricity generation technology.

Solar

Solar energy technologies potentially suitable for use in utility-scale applications include concentrating solar power (CSP) and photovoltaic (PV). Use of either technology requires large areas, often thousands of acres, for solar radiation collection. For example, a 200 megawatt concentrating parabolic trough solar thermal power plant will generally require two square miles or 1,280 acres of land (6.4 acres per megawatt).

Concentrating Solar Power Technologies

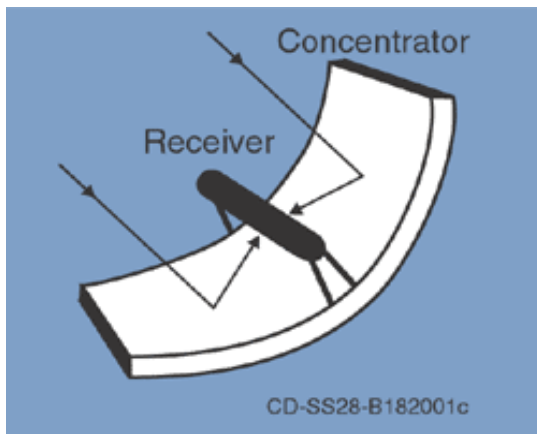
CSP technologies use mirrors to concentrate (focus) the sun's light energy and convert it into heat to create steam that drives a turbine and generate electrical power. The power plants consist of two parts: one that collects solar energy and converts it to heat, and another that converts the heat energy to electricity. Within the United States, CSP plants have operated reliably for more than 15 years.

CSP plants are thermal electric generating power plants and thus produce waste heat that must be dissipated to the atmosphere. Some use forced-draft wet cooling towers that release the waste heat to the ambient atmosphere by the evaporation of water. Forced draft wet cooling towers use large fans to provide air movement upward through falling water and are rectangular, box-like structures. In desert areas, dry cooling radiators are preferred by agencies, since water is scarce and could be used for residential, agricultural, commercial, environmental, or other industrial uses for which there are few or no water source alternatives. Dry cooling radiators also use large fans to draw air through the radiator to reject the waste heat. Dry cooling towers have lower efficiency and higher energy consumption than wet, evaporative cooling towers, due to the required fans. In the desert, use of dry cooling can decrease plant efficiency by three to six percent, when compared to efficiencies of plants using wet cooling technologies. Dry cooling technologies require more cooling towers than wet cooling, so land requirements are greater. Other trade offs are noise and aesthetics. Dry cooling towers are generally noisier than wet cooling towers due to the fans; some fans are quieter than others. Dry cooling towers are generally taller than wet cooling towers, so they may be more visible in certain environments.

Generally, five types of concentrating solar thermal technologies are being proposed in the desert region. They are: parabolic trough, compact linear Fresnel reflector, power tower, power trough, and dish/engine systems.

Parabolic trough systems use large, curved (parabolic) reflectors (focusing mirrors) that have oil-filled pipes running along their focal point, as shown in **Figures 1 and 2**. The mirrored reflectors track the sun on a single axis and focus sunlight on the pipes to heat the oil inside to as much as 750°F. The hot oil is sent to a heat exchanger for heating water into high temperature steam and running conventional steam turbines and generators.

Figure 1: Parabolic Trough Diagram



Source: <http://solareis.anl.gov/guide/solar>

Figure 2: Parabolic Trough System



Source: California Energy Commission 2009

Compact linear Fresnel reflector (CLFR) systems use a relatively new flat mirror technology rather than the parabolic mirrors typically used in trough systems. CLFR facilities are designed to use water as the heat transfer fluid (HTF) rather than conventional synthetic oils, producing steam directly at the solar field. The concentrated solar energy boils water within a row of specially coated stainless steel pipes in an insulated cavity to produce saturated steam. The steam produced in the receivers is collected in a series of pipes, routed to steam drums, and then to the two turbine generators. Steam used by the steam turbines is condensed back to water and returned to the solar field.

Flat mirrors and water used as an HTF simplifies system design and operation and could be expected to result in savings of both capital and operating costs. Notwithstanding such design variations, the power block and cooling system options are the same for CLFR and the standard parabolic trough technology. A potential advantage of CLFR systems is a smaller land requirement. For this technology, the troughs may be built lower to the ground and spaced closer together, resulting in a lower land requirement of about 3 to 4 acres per megawatt. This lower overall profile also offers less wind resistance, simplifying the design of the supporting superstructures.

Figure 3: CLFR Mirrors



Source: Carrizo Energy LLC

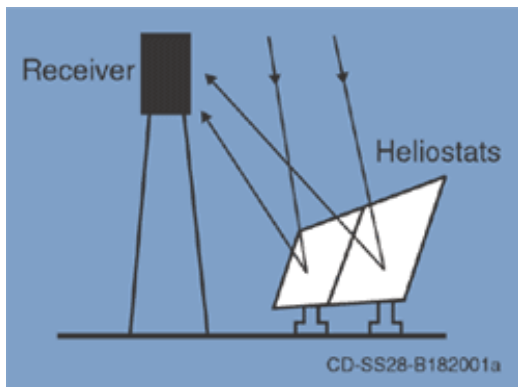
Figure 4: CLFR Supporting Structures



Source: Carrizo Energy LLC

Power tower systems, also called central receivers, use many large, flat heliostats (mirrors) to track the sun on two axes and focus its rays onto a receiver. As shown in **Figures 5 and 6**, the receiver sits on top of a tall tower in which concentrated sunlight heats water into steam or a fluid, such as molten salt, to temperatures as hot as 1,050°F. The molten salt can be used immediately in a heat exchanger to make high temperature steam for electricity generation, or it can be stored for later use. Molten salt retains heat efficiently, so it can be stored for hours and possibly up to two to three days before being converted into electricity. That means electricity can be produced during periods of peak need on cloudy days or even several hours after sunset.

Figure 5: Power Tower Diagram



Source: <http://solareis.anl.gov/guide/solar>

Figure 6: Power Tower System

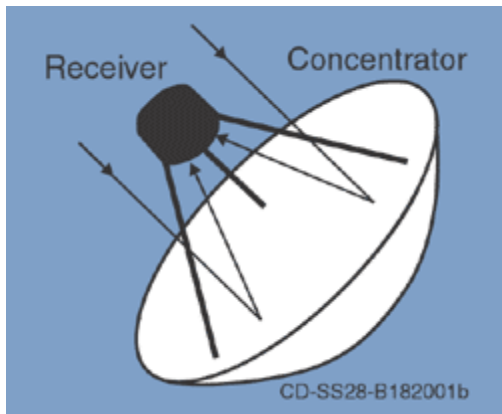


Source: California Energy Commission 2009

Dish/engine systems use mirrored dishes from 20 to 40 feet across to focus and concentrate sunlight onto a receiver. As shown in **Figures 7 and 8**, the receiver is mounted at the focal point of the dish. To capture the maximum amount of solar energy, the dish assembly tracks the sun across the sky on two axes. The receiver is integrated into a high-efficiency "external" combustion engine. The engines use hydrogen or helium gas as the working fluid to move

pistons to generate electricity. The receiver, engine, and generator comprise a single, integrated assembly mounted at the focus of the mirrored dish.

Figure 7: Dish System Diagram



Source: <http://solareis.anl.gov/guide/solar>

Figure 8: Solar Dish System



Source: California Energy Commission 2009

Solar Photovoltaic (PV) Technologies

Solar cells convert sunlight directly into electricity and are made of semiconductor material layers similar to those used in computer chips. When sunlight is absorbed by these materials, the solar energy knocks electrons loose from the atoms, allowing the electrons to flow through the material to produce electricity. PV systems do not use steam generators and thus do not require thermal cooling equipment. Generally, and based on project applications, land requirements for utility-scale PV power plants are in the range of about nine acres per megawatt. For a 200 megawatt plant, about 1,800 acres, or more than two square miles, would be required.

Flat-plate PV arrays are comprised of solar cell modules. Solar cells are generally very small, and each may be capable of generating only a few watts of electricity. They are typically combined into modules of about 40 cells; the modules are in turn assembled into PV arrays up to several meters on a side.

These PV arrays can be mounted at a fixed angle facing south or they can be mounted on a tracking device that follows the sun, allowing them to capture more sunlight. For utility-scale electricity generating applications, hundreds of arrays are interconnected to form a single, large system.

Thin film PV arrays are similar in all outward appearances to flat-plate PV arrays. Traditional solar cells are made from silicon, are usually flat-plate, and generally are the most efficient. Second-generation solar cells are called thin-film solar cells because they are made from

amorphous silicon or nonsilicon materials such as cadmium telluride. Thin film solar cells use layers of semiconductor materials only a few micrometers thick.

Figure 9: Thin Film Solar Array



Source: http://www.nrel.gov/learning/re_photovoltaics.html

Concentrated PV (CPV) systems concentrate sunlight on solar cells, greatly increasing the efficiency of the cells. The PV cells in a CPV system are built into concentrating collectors that use a lens or mirrors to focus the sunlight onto the cells. CPV systems must track the sun to keep the light focused on the PV cells.

Figure 10: CPV Solar arrays



Source: California Energy Commission 2009

Wind

Modern wind energy development uses utility-sized turbines that typically range from 100 kilowatts up to 5 megawatts to convert the wind's kinetic energy to electricity. These turbines primarily are grouped into large wind farms, which produce power for the electric grid.

The following description summarizes information from the National Renewable Energy Laboratory, http://www.nrel.gov/learning/re_wind.html. Turbines catch the wind's energy

with their propeller-like blades. Usually, two or three blades are mounted on a shaft to form a rotor. A blade acts much like an airplane wing. When the wind blows, a pocket of low-pressure air forms on the downwind side of the blade. The low-pressure air pocket then pulls the blade toward it, causing the rotor to turn. This is called lift. The force of the lift is actually much stronger than the wind's force against the front side of the blade, which is called drag. The combination of lift and drag causes the rotor to spin like a propeller, and the turning shaft spins a generator to make electricity.

The largest installed wind turbines in the country can stand up to 300 feet tall and have rated capacities of up to 5 megawatts. The largest wind turbines installed to date in the California desert are 2.5 megawatts and about 250 in height, each, at the Edom Hill Wind Farm near Palm Springs; the farm was recently repowered and is 20 megawatts in size. Within each rated capacity, the length of the blades and height of the towers will vary according to site-specific location and wind-speed needs. Larger, taller turbines capture winds at higher elevations and are more powerful because of the larger blade sweep-area. Advances in technology, including state-of-the-art control systems and advanced composite materials, also lead to increased productivity.

Wind energy development, also called "wind farms," typically occur on ridgelines, mountain pass areas, foothills or flatter, open desert lands to take advantage of the higher wind speeds. The farms include roads, buildings, equipment yards, electrical substations, and related transmission lines.

Figure 11: Wind Farm on Campo Kumeyaay Indian Reservation in San Diego County, California (each turbine generates 2 megawatts)



Source: California Energy Commission 2009

Geothermal

Geothermal energy is accessed by drilling hot water or steam wells in a process similar to oil drilling. Geothermal energy is an enormous heat and power resource that emits little or no greenhouse gases and is reliable (average system availability of 95 percent)

http://www1.eere.energy.gov/geothermal/geothermal_basics.html.

The geothermal resource depths and types range from shallow (just below the ground surface) to hot water and rock several miles below the ground surface. Deep wells can be drilled a mile or more into underground reservoirs to tap steam and very hot water that can be brought to the surface for use in a variety of applications, such as to drive turbines that drive electricity generators.

In the desert the following types of geothermal power plants are operating or could be proposed:

- Flash-steam plants, which pull deep, high-pressure hot water into lower-pressure tanks and use the resulting flashed steam to drive turbines. Most operating geothermal power plants use flash steam technology.
- Binary-cycle plants, which pass moderately hot geothermal water by a secondary fluid with a much lower boiling point than water. This causes the secondary fluid to flash to vapor, which then drives the turbines.

Figure 12: Geothermal Power Plant



Source: Jim Perry, BLM 2009

Geothermal Power Plant Cooling Systems

Like all steam-turbine generators, geothermal power plants use condensers to remove excess heat from turbine exhaust and convert it from steam to a liquid. This heat transfer is accomplished with use of air or water.

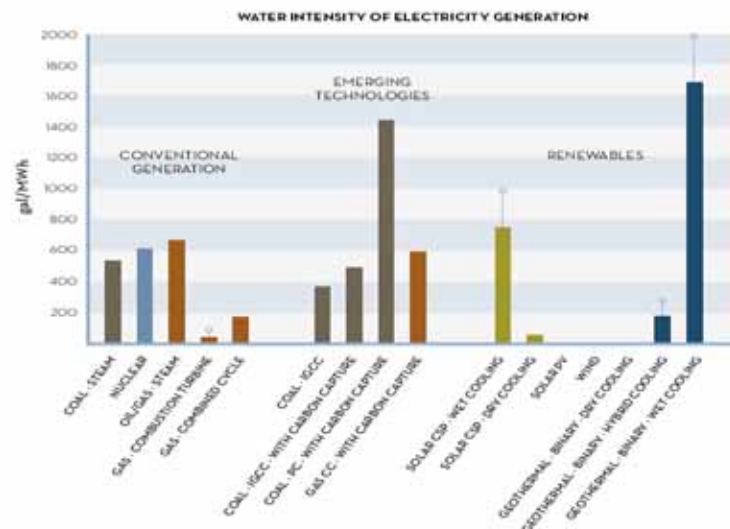
Some binary-cycle geothermal power plants are air cooled because meteorological conditions allow use of the technology without affecting plant performance or insufficient water is available to provide year-round water cooling (Kutscher, C. and D. Costenaro 2002). Air-cooled geothermal plant performance is highly dependent on the ambient air temperature (much more so than fossil fuel plants that operate at higher boiler temperatures). Most air cooling systems use noisy fans to cool the air, but noise can be reduced by use of quieter, albeit more expensive, fans. Plant electric output can drop by 50 percent or more on hot

summer days, compared to winter performance. The reduced summer performance problem is exacerbated by the fact that electricity has a higher value in the summer.

Data from the Salton Sea weather station in Imperial County,⁹ where many geothermal power plants are expected to be built, show ambient air temperatures typically exceed 100°F every day in June through September. When hourly temperatures are hottest, relative humidity is lowest: 24 to 35 percent. In such an extreme hot, dry climate, geothermal power plants can maintain their power output only with water cooling.

Water-cooled systems use cooling towers to reject heat collected from the condenser. Cooling towers reject heat by evaporation, so more than half of the water is lost to the environment (consumed) and must be continuously replenished. The remainder of the water is injected back into the system. The temperature of the geothermal resource determines how much water is consumed by wet-cooled geothermal power plants. **Figure 13** compares water consumption between different types of power plant technologies.

Figure 13: Power Plant Water Consumption Comparison



Source: Western Resource Advocates 2008

⁹ Temperatures and relative humidity are five-year averages calculated from California Irrigation Management Information System for Salton Sea East weather station, <http://www.cimis.water.ca.gov/cimis/frontStationDetailInfo.do?stationId=128>. In July and August, temperatures exceed 100° F at least seven hours daily, and in June and September, they exceed 100° F for two to three hours daily. Data available upon request.

Figure 13, however, understates water consumption by four wet-cooled binary plants at the Ormesa geothermal complex in the Imperial Valley. ORMAT reported the plants' water consumption averaged between 3,360 to 4,200 gallons per megawatt hour in 2009.¹⁰

Sources of cooling water could include: surface, ground, degraded, or recycled water. All flash and some binary-cycle power plants use water cooled systems. For projects where water cooling is essential to the plant's operation, use of degraded or recycled wastewater is preferred when available and technologically and economically feasible.

Geothermal Fluids

Geothermal fluids contain a variety of chemicals, and if they contain high concentrations of salts, they are called geothermal brines. In addition to its major constituents – sodium, chloride, potassium, and calcium – geothermal brine may contain metals and metalloids (semiconductors) including arsenic, barium, boron, lithium, magnesium, silica, strontium, and zinc. Radioactive elements(radium, and radon) are also found in geothermal brines. Exact composition depends on local geology. For example, Salton Sea geothermal brine is hyper-saline compared to most other brines around the world being exploited for geothermal energy.

After well drilling “produces” or brings to the surface geothermal brines, potential storage and disposal problems are created because heavy metals, if they are in the brines, are hazardous in toxic concentrations. Binary geothermal power plants avoid these problems by retaining brines within a closed loop system so that all geothermal brine used in power production is reinjected back underground at a sufficient depth to protect groundwater quality. Flash geothermal power plants, however, expose brines to the environment when the plant process directs geothermal steam to the power plant's turbines.

As the geothermal brines cool, suspended and dissolved solids precipitate out of solution and create scale-formation problems for power plant and injection-well operators. Flash geothermal power plants can control scale formation by adding acid to elevate pH levels or by “seeding” the brine to force precipitation to occur before, rather than after, the geothermal steam enters the turbine. Liquid wastes (including spent brine, steam condensate, and cooling tower blowdown) from geothermal power plants are reinjected underground, but the precipitated solids must be diverted to a filtering and dewatering process and then formed

¹⁰ ORMAT's comments on the Revised Best Management Practices Manual, January 27, 2010, Page 9, http://www.energy.ca.gov/33by2020/documents/bmp_manual_comments/2010-01-27_Ormat_Comments_on_Revised_BMP_Manual_TN-55076.pdf.

into “filter cakes.” These “filter cakes” are stored in an enclosed space before their transfer to a permanent landfill.

Despite efforts to limit scale formation, some scale still deposits on the walls of power plant equipment, pipelines, and injection wells. Plant operators use high pressure hoses to “hydroblast” these hard deposits from equipment surfaces. The equipment is then returned to use. The runoff from “hydroblasting” must be channeled to a surface impoundment to prevent arsenic, lead other heavy metal soil contamination.

Surface impoundments are used to:

- Temporarily retain geothermal brines prior to reinjection.
- Temporarily hold geothermal brines after cleanup of unauthorized spills or releases.
- Hold solids that have fallen out of the geothermal brines.
- Retain cooling tower blowdown before reinjection during emergencies and maintenance operations.

Routine testing determines whether the composition of geothermal filter cakes, drilling mud, and scale is hazardous or just contains “designated” wastes not acceptable to municipal landfill operators. In Imperial County, the CalEnergy Monofill Facility is dedicated to receiving non-hazardous solid waste from its nearby geothermal power plants. The facility may accept up to 750 tons per day of the following waste streams: drilling muds and cuttings from construction/reconstruction of geothermal production and injection wells; geothermal filter cake resulting from filter press operations at geothermal power plants; geothermal material-contaminated soil; and incidental plastic sheeting/materials used in transfer vehicles. The facility may also receive the following waste streams after the materials have been characterized as non-hazardous by a California certified laboratory: canal water solids, back wash solids, resin solids, and miscellaneous sludges from mineral recovery facilities, geothermal filter cake sulfur, and lime waste residue.

Reinjection of Geothermal Fluids

Injection wells can provide a safe disposal of geothermal fluids, if properly designed and sited. For geothermal power plants on private or state-owned land, the Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) allows three types of fluid to be disposed via geothermal injection wells:

- Spent geothermal fluids (for example, heat-depleted water from a binary turbine and unflashed geothermal fluid from a flash system’s separator).
- Condensate and other DOGGR-approved fluids from power plant operations (for example, drilling waste fluid and cooling tower blowdown).

- DOGGR-approved supplemental water used to enhance geothermal field production.

Potential problems with injecting geothermal waste fluids have been identified by Sanyal et al (1995) including: cooling of the produced fluid, excessive injection pressure, loss of steam well productivity, groundwater contamination, ground heaving, leakage of injection fluid to the surface, adverse impact to the produced fluid's chemistry, induced seismic activity.

Provided suitable injection sites exist, most problems can be avoided by means of careful siting of injection wells based on exploration, well testing, and reservoir conceptual modeling, and through proper well design and prudent field operation.

Biomass

Biomass generally refers to organic material from plants and animals, including agricultural and municipal solid waste (MSW) and landfill products. More information can be found at <http://www.bioenergywiki.net/index.php/Bioenergy>.

Biomass energy facilities need a sufficient and reliable feedstock to ensure economic viability. In the desert region, there is little forest or agricultural feedstock availability, except possibly in Imperial County. Population densities are also less than in other areas of the state, which results in fewer potential sites for biomass energy facilities. Therefore, no more than a few such facilities are expected.

At present, biofuel refineries (also called biorefineries) associated with MSW landfills and dairy and landfill biogas facilities could be developed in the California desert. Biorefineries would take woodchips, yard clippings, and other usable garbage from landfills and convert them to ethanol. The Energy Commission funded a dairy digester operation in the desert region of San Bernardino County and the project is operating.

MSW Conversion

MSW conversion technologies use advanced thermal, biological, or chemical processes to convert the carbon-based portion of the MSW stream into a synthetic gas (syngas), which is then used to produce electricity, chemicals, and/or fertilizers.

It is possible MSW to energy power plants will be proposed in the California desert. Power plants that use MSW-derived fuels may be eligible for Energy Commission Renewables Portfolio Standard (RPS) certification. The certification criteria allow use of a non-combustion thermal process to convert MSW to clean burning fuel to generate electricity. Use of air in the conversion process is to be limited to temperature control, only. In addition the process 1) cannot produce air contaminants or emissions, surface or groundwater discharges, or hazardous wastes and 2) must remove recyclable materials and green waste before conversion of the material to a biofuel. Plants produce electricity, only, or produce steam and electricity (combined heat and power) where there is a nearby need for process steam.

Digester Gas / Biogas-Type Facilities

Biomass that is high in moisture content, such as animal manure, sewage, landfill material, and food-processing wastes, is suitable for producing biogas using anaerobic digester technology.

Anaerobic digestion is a biochemical process in which particular kinds of bacteria digest biomass in an oxygen-free environment. Several different bacteria types work together to break down complex organic wastes in stages, resulting in the production of "biogas." The biogas produced in a digester (also known as "digester gas") is a mixture of gases, with methane and carbon dioxide making up more than 90 percent of the total. Biogas typically contains smaller amounts of hydrogen sulfide, nitrogen, hydrogen, methylmercaptans, and oxygen.

Agricultural Waste Products

Agricultural biogas technology is a manure management tool that promotes biogas recovery and use as energy by adapting manure management practices to collect biogas. The biogas can be used as a fuel source to generate electricity for on-farm use, for sale to the electrical grid, or for heating or cooling needs. The biologically stabilized byproducts of anaerobic digestion can be used in a number of ways, depending on local needs and resources. Successful byproduct applications include use as a crop fertilizer, bedding, and as aquaculture supplements.

A typical agricultural biogas system consists of the following components: manure collection, anaerobic digester, effluent storage, gas handling, gas use, and solids disposal/reuse,

Municipal Sewage

Municipal sewage also contains organic biomass solids, and many wastewater treatment plants use anaerobic digestion to reduce the volume of these solids. Anaerobic digestion stabilizes sewage sludge and destroys pathogens. Sludge digestion produces biogas containing 60 percent to 70 percent methane, with an energy content of about 600 Btu per cubic foot. Utility delivered natural gas has an approximate energy content of 915 Btu per cubic foot.

Most wastewater treatment plants that use anaerobic digesters burn the gas for heat to maintain digester temperatures and to heat building space. Unused gas is either burned off as waste or could be used for fuel in an electric power producing engine-generator or fuel cell.

Landfill Gas-to-Energy

The same anaerobic digestion process that produces biogas from animal manure and wastewater occurs naturally underground in landfills. Most landfill gas results from the decomposition of cellulose contained in municipal and industrial solid waste. Unlike animal manure digesters, which control the anaerobic digestion process, the digestion occurring in

landfills is an uncontrolled biomass decay process. When bacteria consume the landfill biodegradable wastes, landfill gas is produced containing methane, carbon dioxide, and non-methane organic compounds. Of these major constituents, only the methane gas has value as a power plant fuel.

The efficiency of the process depends on the landfill waste composition and moisture content, cover material, temperature, and other factors. The biogas released from landfills, commonly called "landfill gas," is typically 50 percent methane, 45 percent carbon dioxide, and 5 percent other gases. The energy content of landfill gas is 400 to 550 Btu per cubic foot.

Capturing landfill gas before it escapes to the atmosphere allows for conversion to useful energy. A landfill must be at least 40 feet deep and have at least one million tons of waste in place for landfill gas collection and power production to be technically feasible.

A landfill gas-to-energy system consists of a series of wells drilled into the landfill. A piping system connects the wells and collects the gas. Dryers remove moisture from the gas and filters remove impurities. The gas typically fuels an engine-generator set or gas turbine to produce electricity. The gas also can fuel a boiler to produce heat or steam. Further gas cleanup improves biogas to pipeline quality, the equivalent of natural gas. Reforming the gas to hydrogen would make possible the electricity production using fuel cell technology.

In California, landfills of a minimum size are required to have landfill gas collection and monitoring systems for public safety and environmental reasons. If methane gas migrates beyond a landfill's boundary, it poses a potential public safety risk. Specifically, methane is flammable when its concentration in air is at least between 5 and 15 percent and a strong ignition source is encountered. If methane gas collects within a building, sewer, or other enclosed space and then ignites, it can explode. The California Integrated Waste Management Board (currently CalRecycle) developed best management practices for monitoring the buildup and migration of methane gas from landfills.¹¹

Non-methane organic compounds may be controlled by either flaring the landfill gas or capturing and processing for sale to industrial users. Developing a landfill gas to energy project is a strategy for addressing environmental and public safety issues.

¹¹. See Landfill Gas Control and Monitoring: Best Management Practices for Landfill Gas Monitoring Well/Probe Construction at <http://www.calrecycle.ca.gov/SWFacilities/Landfills/Gas/Monitoring/#BMP>.

Electricity Transmission

Renewable energy development requires a variety of infrastructure facilities to enable the generated energy (electricity) to be delivered (transmitted) to load centers often a great distance from the generation site.

Collection systems typically link multiple generators to a central transformer. The links typically are underground cables to a pad mounted step-up transformer. These transformers increase the voltage to usually 12, 000 volts. From this transformer, the voltage is then carried on low-voltage (12 kilovolt [kV]) overhead lines to an on-site substation.

Substations are the facilities that step up the generated voltage from the renewable energy development to a voltage required by the utility. The substation can range in size from an acre to as many as 40 acres depending on the amount of equipment used. The entire substation is level-graded, fenced, or walled with gravel covering the entire site. All components are mounted on reinforced concrete pads. The site is designed with a stormwater drainage component to prevent water pooling and electrocution hazards. A cluster of remote renewable energy developments would likely feed a substation via collector lines that will vary in length.

The types of equipment usually present in a high voltage substation include: transformers, circuit breakers, filters, potential transformers, voltage and current controlling equipment, and transmission tower structures. Additionally, the entire site has a copper grounding grid, typically no less than 18 inches below the grade.

Figure 14: Imperial Valley Substation near El Centro, California



Source: California Energy Commission 2009

Transmission Line Interconnections

Renewable energy developments connect to high-voltage transmission lines in the same manner as fossil-fueled power plants. The connection to the electric transmission grid is called the first point of interconnection.

The first point of interconnection is determined by the electrical generating station(s) location relative to the transmission system. Where a development is in close proximity or adjacent to a utility substation a few poles are needed to make the connection.

Often a power plant developer will construct a substation as part of the development and connect the project to the nearest transmission line capable of accepting the voltage. The line could be as short as a few hundred feet or several miles long.

Transmission Lines

The electric power system can be divided into the distribution, subtransmission, and transmission systems. With operating voltages less than 34.5 kV, the distribution system carries energy from the local substation to individual households, using overhead and underground lines. With operating voltages of 69-138 kV, the subtransmission system distributes energy within an entire district and regularly uses overhead lines. With operating voltage exceeding 230 kV, the transmission system interconnects generating stations and large substations located close to load centers, like cities, by using overhead lines.

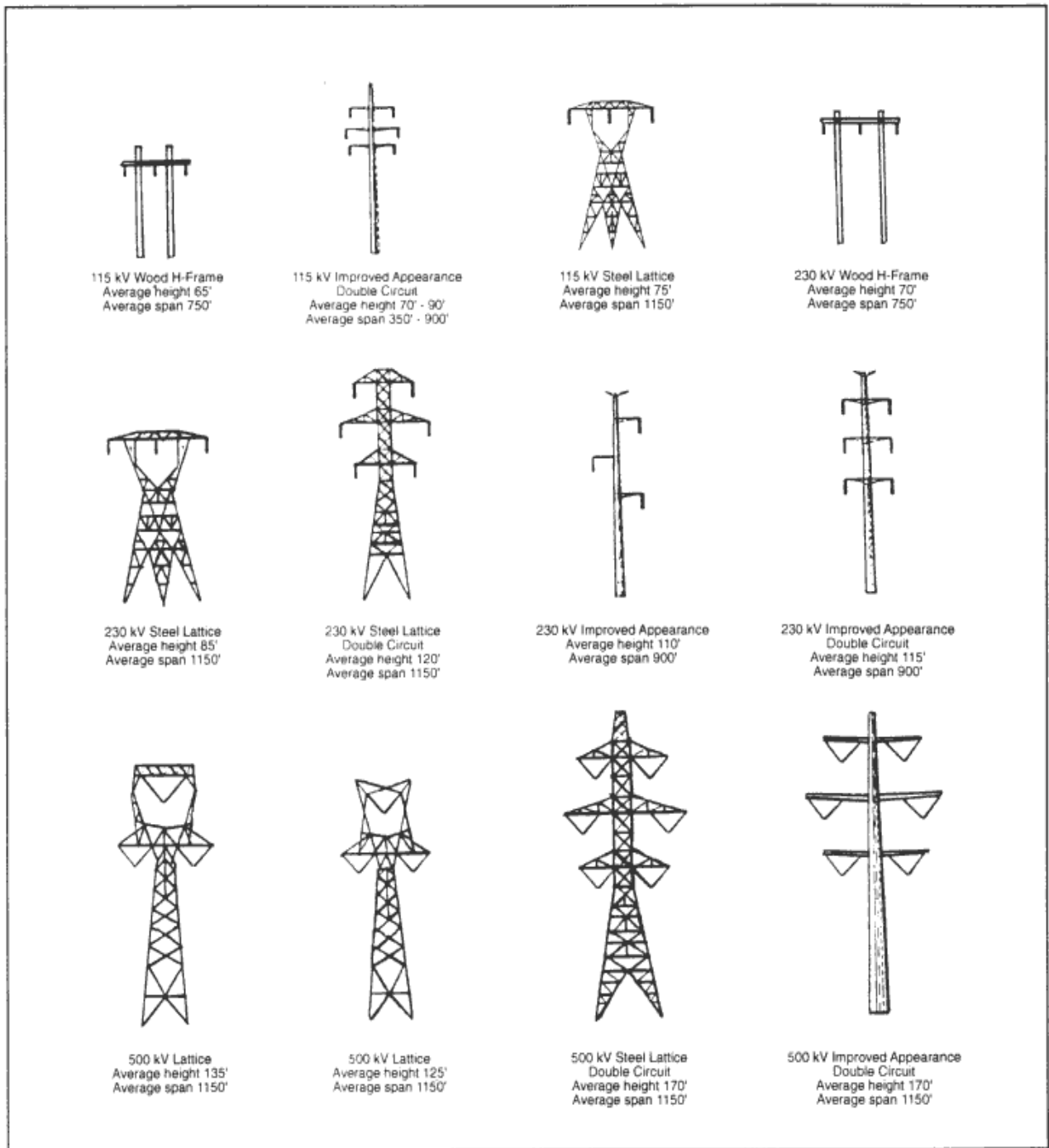
Transmission lines and structures are designed for the environmental and operating conditions that are common to the geographic area of use. Most lines require a right-of-way (also called an easement) of up to 300 feet or more in width for multiple transmission lines, maintenance/access road(s), and laydown areas for construction.

Different types of towers or poles are used to carry the wires. The structure type and height is dependent on the voltage rating, distance between towers, number of circuits (each line has at least one, some may have two), and the locale such as mountains, forest, river crossings, seismicity, urban, rural, or open terrain. The materials for the structures include pressure-treated wood poles, both single and H-frame, steel pole, and steel lattice towers.

Due to environmental and economic concerns, reconductoring or rebuilding a transmission line is preferred over expanding existing rights-of-way or creating new rights-of-way to build new transmission lines. Examples of the different configurations and average height and span between towers are shown in **Figure 15** below.

Figure 15: Transmission Line Structures

ORNL DWG95-7685



Source: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1437/v1/fig005.html>.

APPENDIX C: Informational Resources & Internet Links

Agricultural Resources

California Land Evaluation and Site Assessment (LESA), *California Department of Conservation, Land Resource Protection Unit, LESA*-- http://www.consrv.ca.gov/DLRP/qh_les.htm.)

Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, *California Department of Conservation, Land Resource Protection Unit, Farmland Mapping and Monitoring Program* -- <http://www.conservation.ca.gov/DLRP/fnmpl/index.htm>.

United States Department of Agriculture, Natural Resources Conservation Service, Conservation Programs -- <http://www.nrcs.usda.gov/Programs/>.

Airport Compatibility

Federal Aviation Administration Western Pacific Regional Office--
http://www.faa.gov/about/office_org/headquarters_offices/arc/ro_center/index.cfm?file_name=contact_us_western_pacific.

Contact the regional Airport Land Use Commission, city/county planning department, airport manager.

Air Quality

California Air Resources Board-- <http://www.arb.ca.gov/desig/adm.htm>, and *California Air Resources Board Community Health Air Pollution Information System (CHAPIS)*--
http://www.arb.ca.gov/gismo/chapis_v01_6_1_04/.

Clean Air Act General Conformity Rule, United State Environmental Protection Agency--
<http://www.epa.gov/air/genconform/> and *Bureau of Land Management*--
<http://www.blm.gov/nstc/air/index.html>.

Contact the local air quality management district and California Energy Commission Air Quality Unit.

Atmospheric Extremes and Dispersion

NOAA Satellite and Information Service, National Climatic Data Center, National Environmental Satellite, Data, and Information Service-- <http://www4.ncdc.noaa.gov/cgi-win/wwwcgi.dll?wwAW~MP~F>.

Biological Resources

Federal or state habitat conservation or management area, *regional offices of the United States Fish & Wildlife Service, California Department of Fish & Game, city/county planning departments.*

California Endangered Species Act implementation, *California Department of Fish and Game--*
<http://www.dfg.ca.gov/habcon/cesa>.

Desert tortoise survey protocols and translocation guidance, *U.S. Fish and Wildlife Service--*
http://www.fws.gov/ventura/speciesinfo/protocols_guidelines/, and recovery plan documents, http://www.fws.gov/nevada/desert_tortoise/dt_reports.html.

Federal Endangered Species Act implementation, *U.S. Fish and Wildlife Service--*
<http://www.fws.gov/endangered/>.

Historic range of a federal or state listed Rare, Threatened or Endangered species, *California Department of Fish & Game, Wildlife Habitat Data Analysis Branch --*
<http://www.dfg.ca.gov/whdab/index.html> and the California Natural Diversity Data Base--
<http://www.dfg.ca.gov/whdab/html/cnddb.html>.

Federal or state listed protected or sensitive plant species, *California Native Plant Society website--* <http://www.cnps.org>, and the California Natural Diversity Data Base--
<http://www.dfg.ca.gov/whdab/html/cnddb.html>.

Locally protected trees as a result of an adopted city/county tree protection or preservation ordinance, *city/county planning departments, city departments of parks and recreation.*

Community Relations

U.S. Census Bureau census block information, *California Department of Finance, Demographic Research Unit--* <http://www.dof.ca.gov/HTML/DEMOGRAP/Druhpar.asp>.

Community Resources

Local government enterprise zone or similar area, *local city/county planning department and the local economic development agency*-- <http://www.ecodevdirectory.com/california.htm>.

Labor force, *California Employment Development Department Labor Market Information Division* -- <http://www.labormarketinfo.edd.ca.gov/> and www.calmis.ca.gov/file/resource/LMIConsultants.pdf.

Cultural Resources

Federal or state register of historic places (both registers include districts, sites, buildings, structures, and objects that are significant in American or California history, architecture, archeology, engineering, and culture), *U.S. Department of the Interior, National Park Service, National Register of Historic Places*-- <http://www.nationalregisterofhistoricplaces.com/welcome.htm> and *California Office of Historical Preservation - California Historical Resources Information System (CHRIS)*-- http://ohp.parks.ca.gov/default.asp?page_id=1068.

Native American sacred sites, *California Native American Heritage Commission*-- <http://ceres.ca.gov/nahcl/>.)

State of California Tribal Consultation Guidelines-- [http://www.opr.ca.gov/programs/docs/09_14_05%20Updated%20Guidelines%20\(922\).pdf](http://www.opr.ca.gov/programs/docs/09_14_05%20Updated%20Guidelines%20(922).pdf).

Review city/county registers and contact local historical organizations.

Environmental Impact Analyses

California Environmental Quality Act-- <http://www.ceres.ca.gov/ceqa>.

National Environmental Policy Act network—<http://ceq.nss.doe.gov/nepa/nepanet.htm>.

Fire Hazard Area

High fire hazard area, *California Department of Forestry and Fire Protection, Fire Resources Assessment Program*-- <http://frap.cdf.ca.gov/data/frapgismaps/select.asp>.

Contact city/county fire protection departments.

Flooding

Flood Hazard Zone (for example, A, A1-30, D, et cetera), *Federal Emergency Management Agency (FEMA) website--*

<http://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1>.

Contact the city/county planning department or regional flood control agency.

Hazardous Materials On-Site

Hazardous substances, or spills, *California Environmental Protection Agency, Department of Toxic Substances Control - Site Cleanup--* <http://www.dtsc.ca.gov/SiteCleanup/index.cfm>.

Underground storage tank(s), *California Environmental Protection Agency, State Water Control Board Water Quality - Underground Storage Tank Program--* <http://www.swrcb.ca.gov/tankpage.html>.

Contact the city/county environmental health department and/or U.S. Environmental Protection Agency, as appropriate.

Public Agencies – Selected

California Department of Fish and Game-- <http://www.dfg.ca.gov/about/resource-mgmt.html>.

California Department of Conservation Division of Oil, Gas, and Geothermal Resources-- <http://www.conservation.ca.gov/dog/geothermal/Pages/index.aspx>.

California Energy Commission-- <http://www.energy.ca.gov/33by2020/index.html>.

California Independent System Operator-- <http://www.caiso.com>.

California Natural Resources Agency -- <http://resources.ca.gov/>.

California Public Utilities Commission-- <http://www.cpuc.ca.gov/PUC/energy>.

California State Lands Commission-- <http://www.slc.ca.gov>.

U.S. Department of Interior Bureau of Land Management-- <http://www.blm.gov/wo/st/en/prog/energy.html>.

U.S. Department of Interior Fish and Wildlife Service-- <http://www.fws.gov>.

Seismic Safety

Regulatory Hazard Zone, *California Geological Survey--*

http://www.consrv.ca.gov/CGS/geologic_hazards/regulatory_hazard_zones/index.htm.

Known seismic hazard zone, *California Geological Survey--*

<http://www.consrv.ca.gov/cgs/index.htm>.

Contact the city/county building or planning department.

Soil and Erosion

Soils, *U.S. Department of Agriculture Natural Resources Conservation Service Web Soil Survey--*

<http://websoilsurvey.nrcs.usda.gov/app>.

Known landslide areas and/or erosion-prone areas, *California Department of Conservation, California Geological Survey--*

http://www.consrv.ca.gov/CGS/geologic_hazards/landslides/index.htm.

Contact city/county building department.

Traffic

High priority federal highway corridor or an adopted regional transportation plan special corridor determined to be of statewide or regional priority for long-term right-of-way preservation, *U.S. Department of Transportation Federal Highway Administration--*

<http://www.fhwa.dot.gov/hep10/nhs/hipricorridors/hpcorqk.html> and *California Department of Transportation (Caltrans)--* <http://www.dot.ca.gov/localoffice.htm>.

Contact the Caltrans district office and city/county public works/transportation department.

Visual Resources

Visual impacts to the landscape, *U.S. Department of the Interior, Bureau of Land Management - Visual Resources Management--* <http://www.blm.gov/nstc/VRM/destech.html>.

APPENDIX D: California Guidelines for Reducing Impacts to Birds & Bats From Wind Energy Development

Below is the Executive Summary of the California Guidelines. The entire report can be found at <http://www.energy.ca.gov/windguidelines/index.html>. Federal guidelines may become available for public comment by December 2010.

Executive Summary

Wind energy is expected to play a vital role in meeting California's renewable energy standards, which require that 20 percent of the electricity sold in California come from renewable energy resources by 2010. The California Energy Commission's *2004 Integrated Energy Policy Report Update* recommends a longer-term goal of 33 percent renewable energy by 2020. At the same time California moves to achieve its renewable energy commitments, it must also maintain and protect the state's wildlife resources. Specifically, wind energy development projects in California must avoid, minimize, and mitigate potential impacts to bird and bat populations. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development (Guidelines)* was developed to address these coexisting and sometimes conflicting objectives: to encourage the development of wind energy in the state while minimizing and mitigating harm to birds and bats.

The recommendations and protocols discussed in these voluntary *Guidelines* are suggestions for local permitting agencies to use at their discretion, and as a resource for other parties involved in the permitting process. Local governments are encouraged to integrate the recommended study methods described in the *Guidelines* with biological resource information and research unique to their region.

This document is a collaboration of the California Energy Commission (Energy Commission) and the California Department of Fish and Game (CDFG). In its *2005 Integrated Energy Policy Report*, the Energy Commission recommended the development of statewide protocols to address avian impacts from wind energy development. In 2006, many stakeholder participants at a workshop, "*Understanding and Resolving Bird and Bat Impacts*," collectively requested such guidance. The resulting document provides a science-based approach for assessing the potential impacts that a wind energy project may have on bird and bat species and includes suggested measures to avoid, minimize, and mitigate identified impacts. CDFG and the Energy Commission encourage the use of the *Guidelines* for the biological assessment, mitigation, and monitoring of wind energy development projects and wind turbine repowering projects in California.

The objectives of the *Guidelines* are to provide information and protocols for assessing, evaluating, and determining the level of project effects on bird and bat species, and to develop

and recommend impact avoidance, minimization, and mitigation measures. The document is organized around five basic project development steps:

1. Gather preliminary information and conduct site screening.
2. Determine the California Environmental Quality Act (CEQA), wildlife protection and permitting requirements.
3. Collect pre-permitting data using standardized monitoring protocol.
4. Identify potential impacts and mitigation for the permitting process.
5. Collect operations monitoring data using the standardized monitoring protocol.

Information in the *Guidelines* was specifically designed to be flexible to accommodate local and regional concerns, and the recommended protocols may need to be adjusted to accommodate unique, site-specific conditions. The protocols in the document are adaptable to address the specifics of each site such as frequency and type of bird and bat use, terrain, and availability of scientifically accepted data from nearby sources. For most projects, one year of pre-permitting surveys and two years of carcass searches during operations are recommended. However, a reduced level of survey effort may be warranted for certain categories of projects, such as infill development, some repowering projects, or projects contiguous to existing low-impact wind facilities. On the other hand, survey duration and intensity may need to be expanded for other kinds of projects, such as those with potential for impacts to special-status species, or for sites near wind energy projects known to have high impacts to birds or bats. Decisions on the level of survey effort need to be made in consultation with the CEQA lead agency, CDFG, U.S. Fish and Wildlife Service, and local conservation groups. The Energy Commission and CDFG propose to establish a statewide standing science advisory committee that could also provide information to lead agencies seeking additional scientific expertise. The advisory committee will be established through an open process that encourages input from all interested parties.

California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development does not duplicate or supersede CEQA, the California Endangered Species Act statutes or other legal requirements. This document does not alter a lead agency's obligations under CEQA, nor does it mandate or limit the types of studies, mitigation, or alternatives that an agency may decide to require. Because this document complements existing CEQA guidance, following these *Guidelines* will support efforts to comply with CEQA and other local, state, and federal wildlife laws and will facilitate the issuance of required permits for a project, providing a measure of regulatory certainty for wind energy developers. Wind energy developers who use the methods described in the *Guidelines* will secure information on impact assessment and mitigation that would apply to CEQA and to the other wildlife protection laws and will demonstrate a good faith effort to develop and operate their projects in a fashion consistent with the intent of local, state, and federal laws. Such good faith efforts would be considered by CDFG before taking enforcement actions for violation of a California wildlife protection law.

This document reflects close coordination of the Energy Commission and California Department of Fish and Game and advice from scientists and legal experts, as well as public input from wind energy development companies, counties, conservation groups and other non-governmental organizations, and private citizens. The Energy Commission and CDFG thank all those who participated in the development of these *Guidelines* and encourage lead agencies and all parties interested in the development of California's wind energy resources to use the *Guidelines* as a resource on all future wind energy projects.

ATTACHMENT I: Biological Resource Survey and Assessment Guidance

Abandoned/Old Mines

Abandoned/Old Mines Wildlife Survey Protocols & Mine Closure Considerations

Survey abandoned mines for bat use before closing

Bats and Mines

Mohave Ground Squirrel

Mohave Ground Squirrel Survey Guidelines

Native Plants

Native Plant Materials Manual

Survey Protocols Required for NEPA and ESA Compliance for BLM Special Status Plant Species

Protocols for Surveying and Evaluating Impacts to Special Status Plant Populations and Natural Communities

General

Recommended Biological Resources Field Survey Guidelines for Large Solar Projects

Template and Guidance on Preparing an Endangered Species Act Section 7 Consultation Initiation Package, 2009

**Abandoned/Old Mines
Wildlife Survey Protocols & Mine Closure Considerations
California Department of Fish and Game
March 11, 2010**

As renewable energy projects are sited, they may be placed on or near land that has old mines. Mines present both a potential hazard and potential wildlife habitat. As such, they need to be assessed for their potential as wildlife habitat before any measures are taken to close the mines. In addition, the presence of mines on or near a proposed energy project means that habitat features that could be used by animal species that use the mine must be evaluated, including how loss or change to a habitat feature may alter the suitability of the mine. For example, a maternity roost of bats that is just offsite from a proposed energy project may not be directly affected by the project construction and operation, but if the project alters water availability or foraging habitat, that could affect the success of the maternity colony in the mine.

Most bat species use a variety of roosts throughout the annual cycle as dictated by physiological and behavioral needs. This is especially true of bats roosting in mines. Rarely do bats occupy a single mine year round. The timing of surveys will influence the ability to detect bat use of a given mine feature. This in turn can affect the treatment that a mine may receive (sealing/hard closure, bat-compatible closure or no action). There is no substitute for site-specific wildlife surveys using established survey protocols designed to detect bat use, nor is there a universal style of mine closure (i.e. metal culverts). Some bat species do not accept culverts or even gates (such as large free-tailed bat colonies, some *Myotis* maternity colonies, and others.). To understand the importance of a single mine feature, most of the mines in a given geographic unit (drainage or mountain range) may need to be evaluated to determine those with the most significant bat use at different times of the year. The scope of the "landscape" will depend on the species of bat and their dispersal ability. The goal is to identify and protect the most important bat roosting mines with the best type of closure, and to avoid killing wildlife if a non-wildlife compatible method is selected.

In addition to bats, there are records of desert tortoises and bighorn sheep using mines, so mines must be evaluated in light of potential wildlife use in general, not just bat use.

For specific information about recommended bat survey methods, and protection considerations, refer to the attached papers: "Survey abandoned mines for bat use before closing" and "Bats and Mines", and see Bats and Mines by Bat Conservation International (<http://www.batcon.org/index.php/what-we-do/bats-and-mines/subcategory/91.html>).

In addition, within the next year, the California Bat Conservation Strategy should be released, with California-specific information and recommendations for bats and mines.

Survey abandoned mines for bat use before closing

Abandoned underground mines provide important roosting habitat for more than half of the 47 bat species in the United States.

Bats use mines for rearing young in the summer, hibernating, gathering for social activities such as courtship and mating, night roosting, and for crucial rest stops during spring and fall migrations.

The process of determining whether bats are using a specific mine is not simple, but it can be reliably accomplished by following some basic guidelines, according to specialists at Bat Conservation International (BCI).

Under an agreement with funding from the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Agricultural Wildlife Conservation Center (AWCC), BCI developed recommendations for conducting internal and external mine surveys and bat consideration guidelines for mine closures. More complete recommendations are contained in a cooperatively published leaflet entitled *Bats and Mines—Evaluating Abandoned Mines for Bats and Recommendations for Survey and Closure*.

Before a field assessment, it is important to define what will be protected as significant habitat. The assessment begins with a preliminary survey to describe all mine openings and record all information that can be gathered at each opening without underground entry. These data should include entrance dimensions; elevation relative to other openings; airflow direction and temperature; ambient air temperature; obstacles such as rocks, vegetation, limbs, trash, portal, or headframe timbers in the opening; potential hazards; estimated vertical or horizontal depth; presence of internal complexity such as drifts, crosscuts, raises, winzes, or stopes; and observa-

tions of any wildlife or wildlife signs. If a mine cannot be eliminated as wildlife habitat by the initial survey, an external and/or internal survey is warranted.

Internal surveys—the only way to detect hibernating bats—are preferred to external surveys, which are valuable only when bats are present. Internal surveys are the most reliable and least labor-intensive survey for evaluating roost presence and quality.

An internal survey should cover most of the mine before concluding that neither bats nor bat signs are present. Generally, if bat use of a mine is significant, bats or evidence of bats will be seen well before the entire mine has been evaluated.

Anyone entering an abandoned mine must have appropriate training and experience. It is seldom possible to examine all areas of a large, complex mine, but also seldom necessary.

If no evidence of bats is apparent, but the mine has potentially important inaccessible areas or authorities will not permit internal evaluation, additional external observations at entrances may be required.

External surveys are useful when combined with internal surveys at large, complex mines. External surveys alone may not detect use of a mine for hibernation, migratory, and reproductive use.

Survey information is used to help determine the importance of a mine to bats and to make informed decisions such as whether a mine should be closed and feasibility of using bat gates, according to Ed Hackett, a wildlife biologist with the AWCC. The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.



Photos by Merlin Tuttle, BCI
BCI founder Merlin Tuttle (top right) and Bob Doecker conducting bat census in mine; Townsend's big-eared bat (bottom)

Summary of:

Agricultural Wildlife Conservation Center
Project # 68-7482-2-18X

For more information on wildlife conservation technology, contact:

Ed Hackett
NRCS AWCC
Phone: (601) 607-3131
E-mail: ed.hackett@ms.usda.gov
Web site: <http://www.whmi.nrcs.usda.gov>

For more information on this summary, contact:

BCI
Phone: (512) 327-9721
Web site: batcon.org
E-mail: mines@batcon.org



Bats

and

Mines

**EVALUATING ABANDONED MINES FOR BATS:
RECOMMENDATIONS FOR SURVEY AND CLOSURE**



BAT CONSERVATION
INTERNATIONAL

BACKGROUND

Abandoned underground mines provide important roosting habitat for more than half of the 45 bat species in the United States. And their use of abandoned mines is as complex as the varied environments the mines provide. Bats use mines for rearing young in the summer, hibernating, gathering for social activities such as courtship and mating, night roosting, and for crucial rest stops during spring and fall migrations. The process of determining whether bats are using a specific mine is not simple, but it can be accomplished reliably by following these recommendations.

The assessment begins with a preliminary survey to describe all mine openings and record all information that can be gathered at each opening without underground entry. These data should include: entrance dimensions; elevation relative to other openings; airflow direction and temperature; ambient air temperature; obstacles such as rocks, vegetation, limbs, trash, portal or headframe timbers in the opening; potential hazards; estimated vertical or horizontal depth; presence of internal complexity, such as drifts, crosscuts, raises, winzes, or stopes; and observations of any wildlife or wildlife sign. If a mine cannot be eliminated as wildlife habitat by the initial survey, an external and/or internal survey is warranted.

A field crew collects preliminary survey data at an abandoned mine shaft in California's Joshua Tree National Park.





Stained roosting surfaces often provide important clues regarding bat use in mines.



INTERNAL SURVEYS MAY BE NEEDED WHERE:

- ◆ *Large, complex underground mines may have multiple openings.*
- ◆ *Areas with many scattered openings may have unknown underground interconnections.*
- ◆ *Time or funding is too limited for multiple external surveys.*
- ◆ *An understanding of interconnections is essential to maintaining the airflow required by bats.*

EXTERNAL SURVEYS MAY ALSO BE NECESSARY TO:

- ◆ *Determine which entrances bats are using.*
- ◆ *Conduct counts for monitoring population size or trends.*
- ◆ *Minimize disturbances to resident colonies.*
- ◆ *Augment incomplete internal inspections.*

Acquiring complete knowledge of bat use of abandoned mines often requires a combination of both external and internal surveys. The following simplified guide suggests approaches that have proven effective for conditions and situations typically encountered when surveying abandoned mines. It can be used as a starting point to develop a specific program that suits local conditions. (When a statement applies to your situation, proceed to the indicated section.)

CONDUCTING A BAT SURVEY

Complete Internal Survey Possible

An internal survey should cover most of the mine before concluding that neither bats nor bat signs are present. Generally, however, if bat use of a mine is significant, bats or evidence of bats will be encountered well before the entire mine has been evaluated. It is seldom possible to examine all areas of a large and complex mine, but it is also seldom necessary.

Proceed to Section A

Complete Internal Survey Not Possible

If no evidence of bats is apparent, but the mine has potentially important inaccessible areas (such as large stopes or dangerous shafts), or authorities will not permit internal evaluation, additional external observations at entrances may be required.

Proceed to Section B

SECTION A: INTERNAL SURVEYS

A.1 WINTER SURVEY

No guano, other sign, or resident bats	C.2
Guano or other sign	A.2, C.1
Resident bats	C.1
Internal conditions (e.g., water) obscure sign	A.2
All, or enough, of the mine cannot be seen	B.1

A.2 SUMMER SURVEY

No residents (possible night roost, migratory use, specialized reproductive behavior, undocumented use)	A.3
Residents	C.1

A.3 FALL OR SPRING SURVEY

No residents or sign of bat use	C.2
Residents and/or sign	C.1

SECTION B: EXTERNAL SURVEYS

B.1 SUMMER, FALL, OR SPRING SURVEY

All entrances observed; no activity found (multiple surveys performed)	C.2
Bats observed	C.1

SECTION C: CONSERVATION RECOMMENDATIONS

C.1 DECISION TO CONSTRUCT A BAT GATE

- Is a threatened or endangered species involved?
- Is use significant (as determined regionally)?
- Are alternative roosting features nearby and used in the same way?
- How feasible is bat-compatible gating?
- Will preservation of an abandoned roost provide habitat or mitigate habitat destruction elsewhere?
- Is it likely the survey missed evidence of periodic use?

C.2 CLOSURE by ANY MEANS

- Was the survey method adequate?
- Could the survey have missed periodic use?
- If closure is based only on external surveys, their limitations must be understood. For example, while multiple external surveys may be required to detect the presence of bats, a single internal survey might be enough to confirm their presence.
- If there is any concern that bats might be present, conduct a final internal inspection. Schedule exclusions and mine closures when the fewest bats would be using the mine; avoid maternity and hibernation seasons.

RECOMMENDATIONS

INTERNAL SURVEYS


- ♦ Anyone entering an abandoned mine must have appropriate training and experience.
- ♦ When properly conducted, internal surveys are the most reliable and least labor-intensive type of survey for evaluating roost presence and quality.
- ♦ Internal surveys allow better-informed decisions than external observations in choosing appropriate mine-closure strategies.

COLD SEASON SURVEYS

- ♦ Unless pre-hibernation swarming (when bats first appear at hibernation sites) is witnessed, internal surveys are the only way to detect hibernating bats.
- ♦ Hibernating bats must be identified with minimal disturbance. Repeated arousal causes bats to use fat reserves they need to survive the winter.
- ♦ Inspecting even tiny cracks and crevices may be required to find hibernating bats. Guano, roost staining, bat remains, and insect parts indicate use during other seasons.

WARM SEASON SURVEYS

- ♦ The timing of warm season surveys varies by local climate, but they are generally conducted during May through June in southern states and July through August in the north.
- ♦ Mine must be explored quietly because many bat species cannot tolerate disturbances at roost sites, especially when they are giving birth or caring for pups.
- ♦ Maternity colonies may use multiple roosts during a single season, so do not assume that because bats are not present at one roost, a mine is not being used.
- ♦ Guano containing discarded insect remains can indicate night roosting, even if no bats are seen in daytime surveys. If night roosting is suspected, the mine can be checked at night to observe the species and numbers.
- ♦ Identifying other kinds of use, such as courtship or migratory stopovers, can be difficult, but multiple visits to the site or using drop cloths (a light-colored sheet or piece of plastic) to collect guano may help clarify use.



Townsend's big-eared bats (*Corynorhinus townsendii*) are frequent occupants of abandoned mines throughout the western United States and rely on them year-round.

EXTERNAL SURVEYS

- ◆ External surveys are especially useful when combined with internal surveys at large, complex mines.
- ◆ Set up quietly at least 30 minutes before dark and continue observations for at least two hours after sunset. Observers should be as far from the entrance as feasible to minimize disturbance.
- ◆ All entrances to a complex mine should be surveyed on the same night, and surveys should be conducted on nights without rain or heavy wind.
- ◆ Specialized equipment (night-vision goggles or infrared cameras) may be needed. If not available, position observers toward the setting sun so exiting bats are silhouetted or shine a light with a red filter across the mine entrance.
- ◆ When conducting external evaluations, remember that an absence of evidence should not automatically be interpreted to mean that bats do not use the site at other times of the year.
- ◆ With external survey techniques, significant kinds of use — hibernation, reproductive behavior, migratory stopover — are often missed. This is a severe limitation that must be considered if mine closures are to be based on external surveys.

CONSIDERATIONS FOR CLOSURE

- ◆ Are threatened or endangered species affected? If so, a bat-friendly closure is probably warranted.
- ◆ Is the bats' use of the mine especially significant within the geographical region? Maternity or important bachelor colonies of any species justify installation of bat-compatible closure.
- ◆ Are suitable alternative habitats available nearby? These may be good candidates for mitigation and bat-compatible closure.
- ◆ Could the site become an acceptable habitat in the future? If so, a bat-compatible closure would be warranted.
- ◆ All closures must be weighed against the complexity, feasibility, cost, and reliability of comparable, more easily gated features nearby.
- ◆ Destructive closure activities should be coordinated with local bat biologists to avoid trapping unseen bats.
- ◆ Bat-compatible closures should minimize disturbance to bat residents. For example, a bat gate should not be built during the maternity period.
- ◆ The timing of a mine closure must take into account the type of use, species present, and region of the country.

CONTACT INFORMATION



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100 Webster Circle, Suite 3
Madison, MS 39110
(601) 607-3131
www.whmi.nrcs.usda.gov



P.O. Box 162603
Austin, Texas 78716
(512) 327-9721
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CALIFORNIA DEPARTMENT OF FISH AND GAME

MOHAVE GROUND SQUIRREL SURVEY GUIDELINES

(January 2003; minor process and contact changes in August 2010)

Unless a certain circumstance¹ applies, the Department of Fish and Game (Department) requires a survey to be undertaken for the Mohave ground squirrel (*Xerospermophilus mohavensis*) on a project site if the proposed site has potential habitat of this species and the presence of the species on the project site is unknown. Potential habitat is land supporting desert shrub vegetation² within or adjacent to the geographic range³ of the species. A project is an action that results in temporary or permanent removal or degradation of potential habitat. The Department considers a project site to be an area of land controlled by the project proponent, including but not limited to the portion proposed for removal or degradation of potential habitat. The Department considers a project site to be occupied by the Mohave ground squirrel, if an individual of this species is observed, or is captured on any sampling grid, on the project site.

The Department intends for these survey guidelines to apply to projects that would negatively affect ≤ 180 acres or to linear projects ≤ 5 miles in length. For projects of larger scale, the Department requires special survey protocol(s) to be developed through its consultation with either the project proponent or the local lead agency (if appropriate) or both entities.

For projects of the appropriate scale, each survey shall adhere to the following conditions:

1. Studies that include trapping for the Mohave ground squirrel shall be authorized by a Memorandum of Understanding (MOU) or Letter Permit issued by the Wildlife Branch of the Department, or by other permit as determined by the Department, and shall be undertaken only by a qualified biologist. A qualified biologist is a biologist who has demonstrated pertinent field experience in capturing and handling ground squirrels or other small mammals in desert/arid communities and who has been permitted by the Department to work without supervision. Each biologist setting traps, opening traps containing captured animals, or handling captured animals must be named in the MOU or Letter Permit as an authorized person, whether qualified or not to work without supervision.
2. Visual surveys to determine Mohave ground squirrel activity and habitat quality shall be undertaken during the period of 15 March through 15 April. All potential habitat

1 A survey is not necessary in the circumstance that the project proponent prefers to assume that the Mohave ground squirrel is present on the project site and applies for a California Endangered Species Act incidental-take permit (Fish and Game Code Section 2081b) requiring mitigation and compensation.

2 Examples of desert shrub vegetation that is known to provide habitat for the Mohave ground squirrel include (but are not limited to) Mojave Creosote Bush Scrub, Mojave Mixed Woody Scrub, and Desert Saltbush Scrub as described in Holland 1986.

3 Because the limits of the geographic range are not known precisely, surveys may be required in areas up to five miles from currently-documented boundaries.

on a project site shall be visually surveyed during daylight hours by a biologist who can readily identify the Mohave ground squirrel and the white-tailed antelope squirrel (*Ammospermophilus leucurus*).

3. If visual surveys do not reveal presence of the Mohave ground squirrel on the project site, standard small-mammal trapping grids shall be established in potential Mohave ground squirrel habitat. The number of grids will depend on the amount of potential habitat on the project site, as determined by the guidelines presented in paragraphs 4 and 5 of these guidelines.
4. For linear projects (for example, highways, pipelines, or electric transmission lines), each sampling grid shall consist of 100 Sherman live-traps (or equivalent; the minimum length of any trap is 12 inches) arranged in a rectangular pattern, 4 traps wide by 25 traps long, with traps spaced 35 meters apart along each of the four trap lines. At a minimum, one sampling grid of this type shall be established in each linear mile, or fraction thereof, of potential Mohave ground squirrel habitat along the project corridor.
5. For all other types of projects, one sampling grid consisting of 100 Sherman live-traps (or equivalent; the minimum length of any trap is 12 inches) shall be established for each 80 acres, or fraction thereof, of potential Mohave ground squirrel habitat on the project site. The traps shall be arranged in a 10 x 10 grid, with 35-meter spacing between traps.
6. Each sampling grid shall be trapped for a minimum five consecutive days, unless a Mohave ground squirrel is captured before the end of the five-day term on the grid or on another grid on the project site. If no Mohave ground squirrel is captured on a sampling grid on the project site in the first five-consecutive-day term, each sampling grid shall be sampled for a SECOND five-consecutive-day term. Trapping may be stopped before the end of the second term if a Mohave ground squirrel is captured on any sampling grid on the project site. If no Mohave ground squirrel is captured during the second five-consecutive-day term, each sampling grid shall be sampled for a THIRD five-consecutive-day term. The FIRST trapping term shall begin and be completed in the period of 15 March through 30 April. If a SECOND term is required, it shall begin at least two weeks after the end of the first term, but shall begin no earlier than 01 May, and shall be completed by 31 May. If a THIRD term is required, it shall begin at least two weeks after the end of the second term, but shall begin no earlier than 15 June, and shall be completed by 15 July. All trapping shall be conducted during appropriate weather conditions, avoiding periods of high wind, precipitation, and low temperatures (<50°F or 10°C).
7. For projects requiring two or more sampling grids, capture of a Mohave ground squirrel on any grid will establish presence of the species on the project site. Trapping may be stopped on all grids on the project site at that time. For linear projects, very large project sites, project sites characterized by fragmented or highly-heterogeneous habitats, or in other special circumstances, continued

trapping may be necessary.

8. A maximum 100 traps shall be operated by each qualified biologist. Each trap shall be covered with a cardboard A-frame or equivalent non-metal shelter to provide shade. Trap and shelter orientation shall be on a north-south axis. All traps shall be opened within one hour of sunrise and may be closed beginning one hour before sunset. Traps shall be checked at least once every four hours to minimize heat stress to captured animals. When traps are open, temperature shall be measured at a location within the sampling grid, in the shade, and one foot (approx. 0.3 meters) above the ground at least once every hour. Traps shall be closed when the ambient air temperature at one foot above the ground in the shade exceeds 90°F (32°C). Trapping shall resume on the same day after the ambient temperature at one foot (approx. 0.3 meters) above the ground in the shade falls to 90°F (32°C) and shall continue until one hour before sunset. Suggested baits are mixed grains, rolled oats, or bird seed, with a small amount of peanut butter.
9. A qualified biologist shall complete the Survey and Trapping Form, which is found on the last page of these guidelines. This biologist, or the lead agency for the project, shall submit the completed form to the appropriate Department office (see page 4) with the biological report on the project site.
10. The Department may allow variation on these guidelines, with the advance written approval of the appropriate regional habitat conservation planning office (see page 4). Such variations could include biologically-appropriate modification of the trapping dates or changes in grid configuration that would enhance the probability of detecting Mohave ground squirrels. Any variation which concerns trapping or marking methods must be incorporated into the MOU or permit that authorizes the work.
11. If a survey conducted according to these guidelines results in no capture or observation of the Mohave ground squirrel on a project site, this is not necessarily evidence that the Mohave ground squirrel does not exist on the site or that the site is not actual or potential habitat of the species. However, in the circumstance of such a negative result, the Department will stipulate that the project site harbors no Mohave ground squirrels. This stipulation will expire one year from the ending date of the last trapping on the project site conducted according to these guidelines.

Literature Cited

Holland, R. F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Nongame Heritage Program report. California Department of Fish and Game (Sacramento), 156 pages.

CONTACTS

- A. For information on obtaining an MOU or on the type of experience that a qualified biologist must have, contact the following:

Scott D. Osborn
Wildlife Branch, Nongame Wildlife Program
Department of Fish and Game
1812 Ninth Street
Sacramento, CA 95811

voice: (916) 324-3564
fax: (916) 445--4048
e-mail: sosborn@dfg.ca.gov

- B. For information on project review and conservation planning by the Department, as these activities regard the Mohave ground squirrel, contact the following:

(for Kern County)
Habitat Conservation Planning
Central Region
Department of Fish and Game
1234 E. Shaw Avenue
Fresno, California 93710
telephone: (559) 243-4014

(for Los Angeles County)
Habitat Conservation Planning
South Coast Region
Department of Fish and Game
4949 View Ridge Avenue
San Diego, California 92123
telephone: (858) 467-4201

(for Inyo and San Bernardino counties)
Habitat Conservation Planning
Eastern Sierra and Inland Deserts Region
Department of Fish and Game
407 West Line Street
Bishop, California 93514
telephone: (760) 872-1171

Mohave Ground Squirrel (MGS) Survey and Trapping Form (photocopy as needed)

PART I - PROJECT INFORMATION (use a separate form for each sampling grid)

Project name: _____ Property owner: _____

Location: Township _____; Range _____; Section _____; ¼ Section _____

Quad map/series: _____ UTM coordinates: _____
GPS coordinates of trapping-grid corners

Acreage of Project Site: _____ Acreage of potential MGS habitat on site: _____

Total acreage visually surveyed on project site: _____ Date(s): _____
visual surveys

Visual surveys conducted by: _____
names of all persons by date (use back of form, if needed)

Total acres trapped: _____ Number of sampling grids: _____

Trapping conducted by: _____
names of all persons by sampling term and sampling grid (use back of form, if needed)

Dates of sampling term(s): FIRST _____ SECOND _____ THIRD _____
if required if required

PART II - GENERAL HABITAT DESCRIPTION (use back of form, if needed)

Vegetation: dominant perennials: _____

other perennials: _____

dominant annuals: _____

other annuals: _____

Land forms (mesa, bajada, wash): _____

Soils description: _____

Elevation: _____ Slope: _____

PART III - WEATHER (report measurements in the following categories for each day of visual survey and each day of trapping; using 24-hour clock, indicate time of day that each measurement was made; use a separate blank sheet for each day)

Temperature: AIR minimum and maximum; SOIL minimum and maximum; Cloud Cover: % in AM and % in PM; Wind Speed: in AM and in PM



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
CALIFORNIA STATE OFFICE
MANUAL TRANSMITTAL SHEET

Release: 1-242

Date: 09/13/2001

Subject: 1745 - Native Plant Materials Manual

1. Explanation of Material Transmitted: This material contained in this Manual Supplement complements Handbook H-1745 and provides policy and guidance for the use of native plant materials in California.
2. Reports Required: None
3. Materials Superseded: None
4. Filing Instructions: File as directed below.

REMOVE:

None

INSERT: Release 1-242

1745

(Total: 2 sheets, double-sided)


State Director

1745-NATIVE PLANT MATERIAL MANUAL

Table of Contents

- .01 Purpose
- .02 Objectives
- .03 Authority
- .04 Responsibility
- .05 Policy

1745-NATIVE PLANT MATERIAL MANUAL

.01 Purpose. The purpose of this Manual Supplement is to provide policy and guidance specific to the use of native plants and plant seed in restoration and other revegetation projects. The maintenance of diverse native plant communities of California on a long-term basis is an essential part of preserving ecosystem health and productivity, and the introduction of persistent non-natives is clearly contrary to this goal.

Whenever plant materials are used in management activities such as erosion control, water quality, or restoration projects (including reclamation and rehabilitation), consideration needs to be given to long-term plant community stability and integrity. The selection of genetically appropriate native seeds and plants which achieve the purpose of the planting is therefore a concern. These guidelines establish policy on the use of native plant materials on BLM lands under the jurisdiction of the California State Office.

.02 Objectives. The objectives are:

- A. To maintain and restore native plant communities with emphasis on the local genetic composition.
- B. To use local plant materials for vegetation projects such as erosion control, fire rehabilitation, forage enhancement, water quality, and restoration whenever feasible and appropriate.
- C. To prevent the introduction of undesirable vegetation into native plant communities.
- D. To develop improved techniques for native plant restoration.

.03 Authority.

- A. The Federal Land Policy and Management Act of 1976, as amended (43#U.S.C. 1701 et seq.).
- B. Executive Order 13112 of February 3, 1999.
- C. Departmental Manual 235.1.1.A., General Program Delegation, Director, Bureau of Land Management
- D. BLM Manual 1203.3, Redelegation of Authority in State Directors.
- E. BLM Manual 1745 - Introduction, Transplant, Augmentation, and Reestablishment of Fish, Wildlife, and Plants.

1745-NATIVE PLANT MATERIAL MANUAL

.04 Responsibility.

E. The State Director is responsible for:

1. Overall implementation of the policy on the use of Native Plant Materials in California.
2. Periodically reviewing the policy and handbook and revising as appropriate.

B. Field Managers are responsible for:

1. Implementing the policy on the use of Native Plant Materials in their respective areas of jurisdiction.

.05 Policy. The policy of BLM-California is as follows:

A. To the maximum extent possible, germplasm of native species that is adapted to specific abiotic and biotic site conditions shall be used in revegetation efforts.

B. Use of non-local, native or non-native plant materials will occur only when no other feasible alternative exists, or unusual ecological circumstances dictate that their use is superior.

C. All revegetation projects shall incorporate good practices of early planning, peer evaluation, maintenance, monitoring, and annual reporting to ensure project success. This policy applies to BLM projects and all projects that occur on BLM land (ROWs, easements, etc.)



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
CALIFORNIA STATE OFFICE
MANUAL TRANSMITTAL SHEET

Release: 1-243

Date: 09/13/2001

Subject: H- 1745 -1 - Native Plant Materials Handbook

1. Explanation of Material Transmitted: This release transmits the Bureau of Land Management's (BLM) CA-Handbook-Use of Native Plant Materials in California. It provides policy and guidance specific to the use of native plant and plant seed in restoration and other revegetation projects, to ensure the preservation of healthy and productive ecosystems. It directs the use of local plant materials for vegetation projects whenever feasible and appropriate, and gives guidance on improved techniques for native plant restoration. It also provides guidance to prevent the introduction of undesirable vegetation, while emphasizing the use of local genetic composition when restoring native plant communities
2. Reports Required: None
3. Materials Superseded: None
4. Filing Instructions: File as directed below.

REMOVE:

None

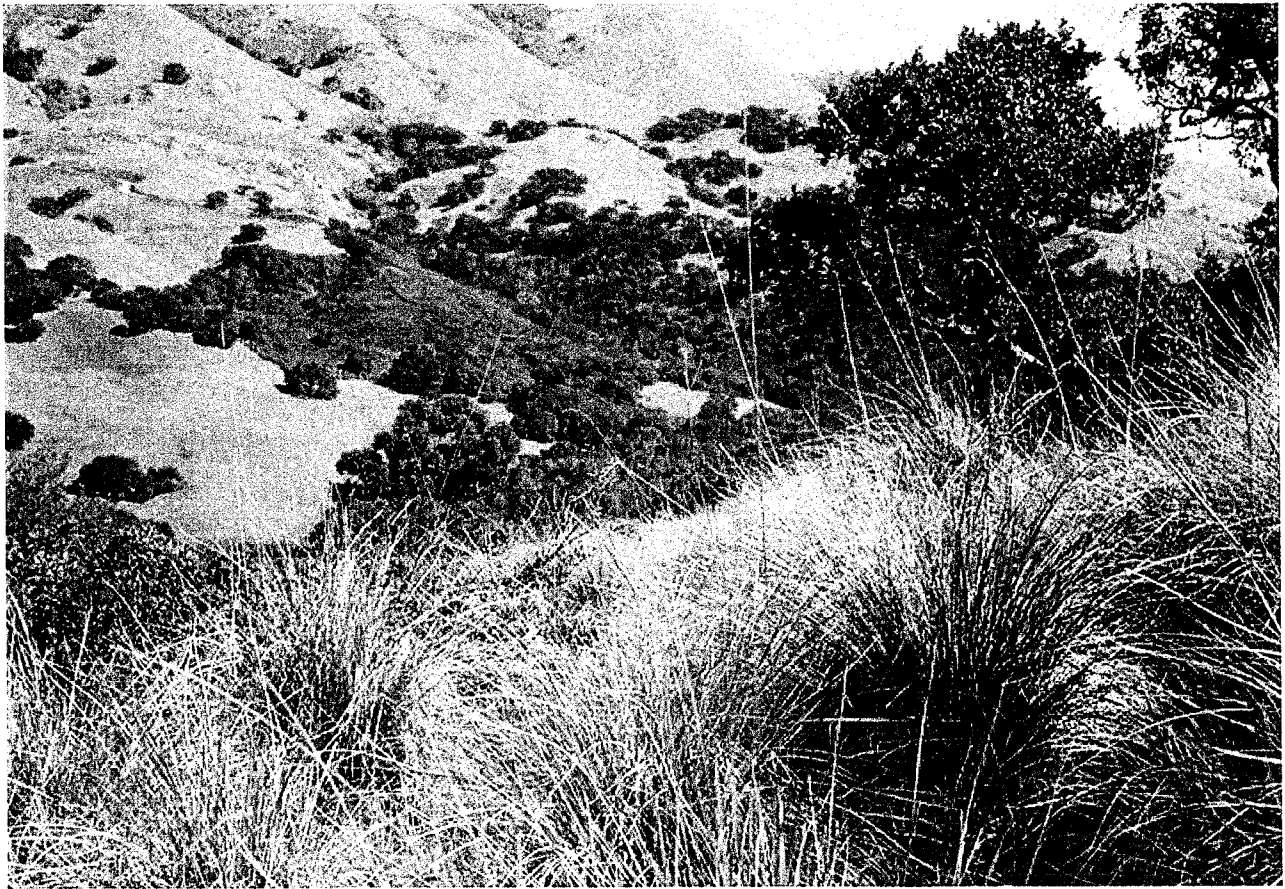
INSERT: Release 1-243

H-1745

(Total: 8 sheets, double-sided)

JAMES NEESBY
#24 State Director

USE OF NATIVE PLANT MATERIALS IN CALIFORNIA



Festuca californica

Photo By: G.F. Hrusa, Ca. Dept. of Food and Ag

H-1745-1-NATIVE PLANT MATERIALS HANDBOOK**Table of Contents**

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H-1745-1-NATIVE PLANT MATERIALS HANDBOOK**CHAPTER I****I. INTRODUCTION**

This handbook provides direction on the use of native plants and plant seed in restoration and other revegetation projects. The maintenance of diverse native plant communities on a long-term basis is an essential part of preserving ecosystem health and productivity, and the introduction of persistent non-native plants is clearly contrary to this goal. The handbook expands on the policy elaborated in California BLM Manual Supplement 1745 and establishes the procedures to be used in complying with that policy.

Whenever plant materials are used in management activities such as erosion control, water quality, or restoration projects (including reclamation and rehabilitation), consideration needs to be given to long-term plant community stability and integrity. The selection of genetically appropriate native seeds and plants which achieve the purpose of the planting is therefore a concern. These guidelines establish policy on the use of native plant materials on BLM lands under the jurisdiction of the California State Office.

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H-1745-1-NATIVE PLANT MATERIALS HANDBOOK

CHAPTER II

II. GENERAL GUIDELINES

A. Planning Stage:

1. Vegetation projects must be planned and evaluated early - preferably several years before the project start date. Seed set may not occur every year, or it may be sparse, so seed collection and stockpiling should begin as early as possible. If nursery grown seedlings are required, allow plenty of time for seed stratification and growing out. Early consideration should also be given to soil stockpiling, erosion control methods, and on-site planting and maintenance activities.
2. Determine the purpose of the planting and set your revegetation goals. If the disturbance has not yet occurred, take measurements of plant composition, density, and cover. Use soil surveys, if available, and look at soil series and ecological sites within the project area as well as the potential natural communities of the site. If this baseline information is not available for the project area, try to find a reference area that is undisturbed and ecologically similar to the project area. Decide what sort of progress can realistically be made toward the desired plant community, and what time-scale you will use to measure progress reports being used to record methodology and results.
3. Determine the desired plant species, the collection method (seeds or cuttings), the amount needed, and the planting method (seeding or transplanting). If nursery services are required, keep in mind that some nurseries require a year or more advance notification.
4. Determine through literature review and personal contacts techniques applicable to the life form you are collecting material from, transplanting, and/or seeding.
5. Develop quality standards for collecting, storing, growing, and outplanting.
6. Develop plans for long-term maintenance and yearly monitoring of the restored area.
7. Develop a contingency plan in case the plant materials become unavailable or fail to survive in the field. Seed availability may be a limiting factor for some species, so several different species should be considered. It is wise to try a variety of restoration methods to increase the odds of success and to determine the best overall method.
8. Maintain an ongoing stock of seed or vegetative materials from frequently used local species in each elevation band within a subsection (see II.D.1, below) if possible, in order to aid in the success of unexpected restoration projects. Meticulous records must be kept on the source

H-1745-1-NATIVE PLANT MATERIALS HANDBOOK

of all materials. A central collection facility may be more advantageous if the source areas are carefully controlled and monitored.

B. Project Review:

All restoration planning efforts must include coordination with Field Office Restoration Coordinators to ensure that the project is feasible and the appropriate plants and methods are used. Coordination with State Office Restoration Coordinators and knowledgeable individuals in other Federal and State agencies and the academic community is also highly desirable.

C. Natural Regeneration:

If there is an ample seed source and suitable conditions, natural regeneration should be encouraged. Topsoil should be salvaged and re-spread if possible, as native seeds and microbiota can often be preserved (if storage length is limited). Erosion control can often be achieved in the interim stage through the use of weed-free mulches such as native grass straw, barley straw, rice hulls, bark, and almond shells.

D. Plant Material Collection:

1. Local Plant Source: To the maximum extent possible, seeds and plants used in restoration, erosion control, fire rehabilitation, forage enhancement, and other projects shall originate from local sources. Local sources often possess genotypes that are adapted to the local environment, leading to higher short-term and long-term success rates. "Local" refers to sources within or as close as possible to the project area and within the same subsection (as shown on the Ecological Units of California map; see definitions), and elevation band (within 500') as the project area. Collections should also be made within the same vegetation series and general soil type.

If the plant population is known to be genetically rare, occurs on an unusual soil (e.g., serpentine), is found in an extreme environment (high temperature, low precipitation, etc.), or has distinct morphological characteristics that may be genetically based, then seeds/cuttings shall only be taken from these local variants. For example, a restoration effort on serpentine soil would use only seeds/cuttings collected on serpentine soil from within the same subsection and elevation band. In addition, disjunct plant populations may be genetically distinct and seeds/cuttings should be taken from within the disjunct population. Riparian species should be collected from riparian areas immediately upstream or downstream, or within sub-watersheds within the same subsection and at similar elevations. If a locally rare species is desired for use in revegetation and can only be collected from the wild, consider whether the local populations can support the impacts of collecting seed or propagules.

These guidelines can and should be tailored to individual species. Variation observed within a species is not always due to population differences; it could be a result of individual

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plant differences, individual seed differences (from the same plant), and collection date differences. The use of common gardens, outplantings, and genetic analysis can be helpful in determining the presence and distribution of ecotypes, and should be done by experienced personnel. Large phenotypic plasticity would indicate that wide seed collection zones would be allowable, while large genetic variability would indicate the use of local ecotypes. Research on the genetic variability of commonly used revegetation species is therefore recommended and encouraged. (Extreme caution should be used in interpreting the results of 1) an isozyme study alone or 2) poorly researched taxa.) As ecotype information becomes available, restoration coordinators should develop seed collection "eco-zones" that will be incorporated into future versions of this policy.

2. Semi-local Plant Source: If sufficient numbers of widely-spaced source plants are unavailable within the same subsection, additional collection should occur in several well distributed sub-populations that have similar environments and are within adjacent subsections within the same section as the project area. Semi-local collection sites should be matched carefully to the project area in terms of elevation, vegetation series, aspect, slope, rainfall, annual temperature patterns, frost dates, and soil type. If plant materials are not available within the same section, consider postponing the project until native sources become available.

3. General: Try to use several (~ 50 or more) unrelated (spaced at least 1/4 mile apart) source plants within the collection area in order to maximize genetic diversity. Collect in areas that match the ecological characteristics of the project area. Only use healthy source plants. Collect seed when it is mature and still on the plant (if possible). For those plants that disperse their seed quickly at maturity, spreading sheets beneath the parent plant is advised. Obtain cuttings at the appropriate time of year and from material that is not too soft. Rapidly growing soft tissue is high in nitrogen and will not produce the auxins needed to root as opposed to more mature, woodier tissue that contains higher ratios of stored carbohydrates. Try to collect an equal number of seeds/cuttings from each source plant. Document the location of all source populations, track the plant materials taken from each population until they reach the field, and monitor the performance of each collection over time. This applies to commercial sources as well. When contracting out for seed collection, make sure the collector is well known, knowledgeable, and respected, and only pay for pounds of PURE LIVE SEED. If collected seeds are grown out in a nursery, make sure that the contract states that the seeds are government property, and cannot be used for commercial purposes. No federally-listed or proposed species shall be used for revegetation without proper coordination with the Fish and Wildlife Service. Consult with the California Department of Fish and Game if state-listed species are being considered for use.

E. Commercial Sources:

If local or semi-local plant sources are unavailable, commercial sources of native plants may be used. Plant materials should be bred and/or grown under environmental conditions that

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are similar to the project area. Ideally, plant sources should be within the same section as the project area. Plant materials should only be moved from one section to another after careful evaluation. Only use commercial sources if the genetic origin is known. Above all, make sure to ask seed companies where the seed was collected, instead of telling them where you need it from! Be sure that nursery produced native seed was not grown under conditions that could have allowed hybridization with other species or other collections of the same species. Commercial sources should be used as an interim measure, using short-lived species, while adequate supplies of local or semi-local plant materials are being collected or grown.

F. Non-Natives:

Although native plants should always be given first consideration, there are certain situations where non-natives may be desired. For example, on highly disturbed sites that have had their physical characteristics altered so that native vegetation can no longer survive, it may be necessary to use non-natives to help restore site stability. Other examples that have been cited include noxious weed control and emergency situations. In cases where the use of non-native vegetation is desired, a justification shall be submitted for approval by the State Director (as outlined in BLM Manual 1745 - Introduction, Transplant, Augmentation, and Reestablishment of Fish, Wildlife, and Plants). All non-native vegetation used should be non-invasive and ideally be short-lived, have low reproductive capabilities, or be self-pollinating in order to prevent gene flow into the native community. One good example is sterile oats, which provide erosion control and will fade out in one year without cultivation (although they do release seed if disturbed). Non-native vegetation should not compete with the naturally occurring native plant community, invade plant communities outside the target area, persist in the target ecosystem over the long term, or exchange genetic material with local native plant species. One approach to selecting such species may be to use genera that do not occur in the target area as there is less likelihood of genetic exchange between genera than between species within a genus. The use of non-natives should be considered as an interim measure only, while local or semi-local sources are developed. Cultivars of native plants produced outside of California require the same justification as non-natives. Non-natives listed in the Department of Food and Agriculture's Noxious Weed Species list or the California Exotic Pest Plant Council's list of wildland weeds shall not be considered for use under any circumstances.

G. Seed Quality:

All seeds/plants used for BLM projects shall be tested for weeds, pests and diseases, and shall be processed, stored, and conditioned properly. Due to the threat of complete project failure, 0% weed species and other crop species is required in seed mixtures (see BLM Manual 9015 - Integrated Weed Management). However, if it can be shown that a certain percent of contamination of a weed species or other crop species does not interfere with native plant establishment and is not persistent in the environment, then this level will be raised on a species basis.

H-1745-1-NATIVE PLANT MATERIALS HANDBOOK**H. Seed Storage:**

Seed storage requirements are highly variable for each species. Generally, each 1% reduction in seed moisture and each 10 ° F reduction in seed temperature doubles the life of the seed. If you wish to store the seeds for 3-5 years at ambient temperatures, dry the seeds to between 5-8% moisture content before tightly sealing in durable containers. For longer storage, dry to 2.5-5% moisture. Make sure you properly label each container with information on species, location of source plant, environmental information, date of collection, and the collector, as a minimum.

I. Planting and Maintenance:

1. If direct seeding, consider using pits or imprinted areas to improve germination, mulches to improve survival, and cracked wheat to reduce granivory. High seeding rates are usually recommended, since direct seeding success rates are lower than transplanting.

2. If transplanting, consider using a variety of container sizes, and try to transplant quickly (preferably in one day). If containers are limited, place more near the windward side of the project area to maximize effectiveness.

3. Plant at an optimal time - usually at the start of the rainy season. A knowledgeable restoration specialist should be consulted if irrigation will be necessary.

4. Permits for projects involving restoration must contain a requirement for maintenance and monitoring of the restored area.

5. Track the success or failure of all restoration projects. An annual report on the status of all restoration projects is required. Even failed efforts yield useful information.

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H-1745-1-NATIVE PLANT MATERIALS HANDBOOK**CHAPTER III****III. ANNUAL REVIEW**

This policy will be reviewed by Field Office and State Restoration coordinators on at least an annual basis, at which time the annual reports will be reviewed as well. The current guidelines for seed collection zones and seed purity are general, and future revisions will be needed to outline regional or species-specific standards.

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H-1745-1-NATIVE PLANT MATERIALS HANDBOOK

CHAPTER IV

IV. DEFINITIONS

Ecological Units of California: Map developed by the Forest Service and Natural Resource Conservation Service in 1994. Subsection units have similar surficial geology, lithology, geomorphic process, soil groups, Subregional climate, and potential natural communities.

Exotic or Non-native Species: One that was introduced through human activity.

Genetically Local Source: Plant material that originated at or within the same subsection and elevation band as the project site.

Native Plant: One that occurs and has evolved naturally in California, and in the project area, as determined by climate, soil, and biotic factors, and that was not introduced by human activity.

Revegetation: A general term for renewing the vegetation on a project site, which may include restoration and rehabilitation.

Stand: Aggregation of individual plants separated from other such aggregations so that cross fertilization rarely occurs (if at all).

Undesirable Plant: May be a non-native species, non-adapted source, genetically changed through selection in a foreign dissimilar environment, or possesses trait(s) that conflict with accomplishment of objectives.

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United States Department of the Interior

BUREAU OF LAND MANAGEMENT
California State Office
2800 Cottage Way, Suite W-1623
Sacramento CA 95825
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July 7, 2009

In Reply Refer To:
6840, 6600, 1600 (CA930)P

EMS TRANSMISSION: 7/7/09
Instruction Memorandum No. CA-2009-026
Expires: 09/30/2010

To: All District Managers and Field Managers

From: State Director

Subject: Survey Protocols Required for NEPA and ESA Compliance for BLM Special Status Plant Species

Purpose: The purpose of this Instruction Memorandum (IM) is to provide guidance on the requirements for conducting special status plant species surveys/inventories for ground disturbing projects. Inventories are conducted for many reasons; however, for the purpose of this document only one inventory “reason” is addressed:

To ensure compliance with the National Environmental Policy Act and the Endangered Species Act by having sufficient information available to adequately assess the effects of proposed actions on special status plants. Assessments of the effects of these actions are documented in biological assessments, if the project involves Federally listed species.

Background: In 1996 the Bureau of Land Management (BLM) California State Director signed the Special Status Plant Management Handbook 6840-1. This Handbook details survey and inventory protocols required by BLM CA. This IM and attached protocols supersede that section of the 6840-1 Handbook.

Policy: It is BLM policy to conduct inventories/surveys to determine the occurrence and status of all special status plant species on lands managed by BLM or affected by BLM actions. This includes proactive inventories directed toward developing plans or determining the status of plant species, as well as inventories conducted to determine the impacts of BLM planned or authorized actions on any special status plants that might be within the area of a proposed project. Such inventories/surveys are to be conducted at the time of year when such plant species can be found and positively identified.

The survey/inventory requirements apply to energy rights-of-way applications on Federal lands managed by the BLM in California and northwestern Nevada. Projects that include State or private lands or require State approval will likely also require conformance with the rare plant survey guidelines of the California Department of Fish and Game

(<http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/guideplt.pdf>).

For further information regarding this IM, please contact Christina Lund, State Botanist, at the California State Office, (916) 978-4638.

Signed by:
James Wesley Abbott
Acting State Director

Authenticated by:
Richard A. Erickson
Records Management

Attachment - 1
Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant
Species (7 pp)

Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species

Policy

It is BLM policy to conduct inventories to determine the occurrence and status of all special status plant species on lands managed by BLM or affected by BLM actions. This includes proactive inventories directed toward developing plans or determining the status of plant species, as well as inventories conducted to determine the impacts of BLM planned or authorized actions on any special status plants that might be within the area of a proposed project. Such inventories are to be conducted at the time of year when such plant species can be found and positively identified.

Definition and Purpose

Inventory is the periodic and systematic collection of data on the distribution, condition, trend, and utilization of special status plant species (BLM Manual 6600).

Inventories are conducted for many reasons; however, for the purpose of this document only one inventory “reason” is addressed:

To ensure compliance with the National Environmental Policy Act and the Endangered Species Act by having sufficient information available to adequately assess the effects of proposed actions on special status plants. Assessments of the effects of these actions are documented in biological assessments (if the project involves Federally listed species and qualifies as a "major construction activity" as defined by the ESA).

Special status plants include plant taxa that are Federally listed as threatened and endangered, proposed for Federal listing, candidates for Federal listing, State listed as rare, threatened, or endangered, or BLM sensitive species. All plant species that are currently on List 1B of the California Native Plant Society’s Inventory of Rare and Endangered Plants of California (<http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi>), are BLM sensitive species, along with others that have been designated by the California State Director. BLM is party to a Memorandum of Understanding with the California Department of Fish and Game to collect information for inclusion in the California Natural Diversity Data Base. Therefore, in addition to inventorying for plants formally recognized as special status species by BLM, contractors must also inventory for all plant, lichen, and fungi species recognized as “special” by the California Natural Diversity Data Base (<http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPPlants.pdf>). Although the following discussion uses the term “special status plants,” it should be interpreted to mean all of the plant taxa discussed above.

The inventory requirements below apply to energy rights-of-way applications on Federal lands managed by the BLM in California and northwestern Nevada. Projects that include State or private lands or require State approval will likely also require conformance with the rare plant

survey guidelines of the California Department of Fish and Game (<http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/guideplt.pdf>).

Timing and Intensity of Inventory

Before conducting inventories, contractors for BLM or energy companies should research three valuable sources to see if BLM special status species are known from the project area: the California Natural Diversity Data Base (CNDDB), CALFLORA, and the Biogeographic Information & Observation System (BIOS). However, CNDDB and BIOS are positive occurrence databases only, the lack of data should not be used as verification that the species does not exist in a given location. Inventories must be timed so that contractors can both locate and positively identify target plant species in the field. Inventories must be scheduled so that they will detect all special status species present. A single inventory on a single date will seldom suffice. For example, when one special status plant species suspected to be in the inventory can only be found and identified in April and another species can only be located and identified in August, at least two inventories are necessary. The first inventory can facilitate the second and/or third inventory, however, if potential sites for the late-flowering species are flagged during the first inventory. If sufficient information is available on the habitat requirements of potentially occurring species (substrate, plant community, etc.), and the site in question is believed to be unsuitable for those species, a field visit should still be conducted to document and validate the assumptions for believing that the species to be absent. In advance of the project site inventory, contractors should visit known populations of the target species in similar habitat conditions to determine current-year growth conditions and phenology. If, based on these visits to known populations, it appears likely that the project site inventory will fail to detect occurrences because of drought conditions (as may be the case for annual plant species or geophytic plants), BLM may require contractors to perform additional inventories in the following year.

Field Survey - Methodology

Field surveys will be floristic in nature, i.e., the contractor identifies every plant taxon observed in the project area to the taxonomic level necessary to determine rarity and listing status. Surveys will be conducted so that they will ensure a high likelihood of locating all the plant taxa in the project area. Depending on the size of the project area and the heterogeneity of the habitats within the project area, surveys will involve one or a combination of the following survey methods.

Complete Survey

A complete survey is a 100 percent visual examination of the project area (Figure 1) using transects. The length of the transect and distance between transects might change as the topography changes throughout the project area. Transects should be spaced so that all of the area between transects is visible and so that the smallest rare plant expected to occur is visible. The surveyor (1) compiles a species list while traversing the project area and keeps track of the plant community or habitat type where each taxon occurs; (2) maps the locations of all rare taxa

encountered using a GPS unit, and (3) fills out a CNDDDB Native Species Field Survey Form for each location of each rare taxon encountered.

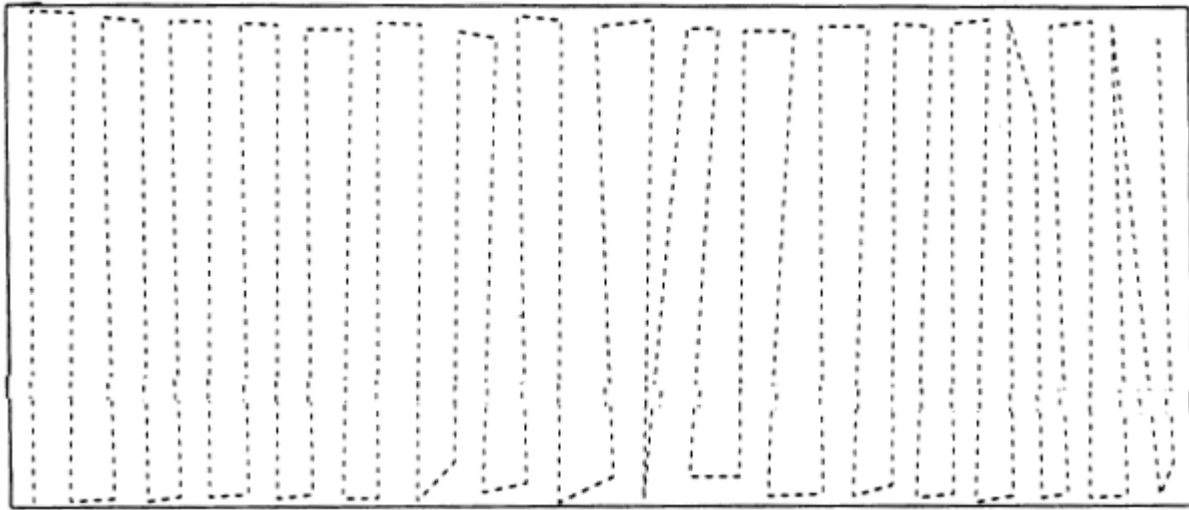


Figure 1. **Complete survey.**

Intuitive Controlled Survey

An intuitive controlled survey is a complete survey of habitats with the highest potential for supporting rare plant populations and a less intense survey of all other habitats present (Figure 2). This type of survey can only be accomplished by botanists familiar with the habitats of all the plant species that may reasonably be expected to occur in the project area. The botanist traverses through the project area enough to see a representative cross section of all the major plant habitats and topographic features. During the survey, the botanist compiles a species list of all plant taxa seen en route and keeps track of the plant community or habitat type where each taxon occurs. The surveyor maps the locations of all rare taxa encountered using a GPS unit and fills out a CNDDDB Native Species Field Survey Form for each location of each rare taxon encountered. When the surveyor arrives at an area of “high potential” habitat, s/he surveys that area completely as described above and shown in Figure 1. High potential habitat areas include areas defined in a pre-field review of potential rare plants and habitat and other habitats where a rare species appears during the course of initial field work traversing the project area. Areas within the project area that are not the focus of a complete survey must be surveyed sufficiently so that is the botanist and BLM reasonably believe that few if any additional species would be added to the complete species list for the project area. The report must justify why the botanist did not consider these areas to have a high potential for supporting rare plant species and thus did not subject the area to a complete survey.

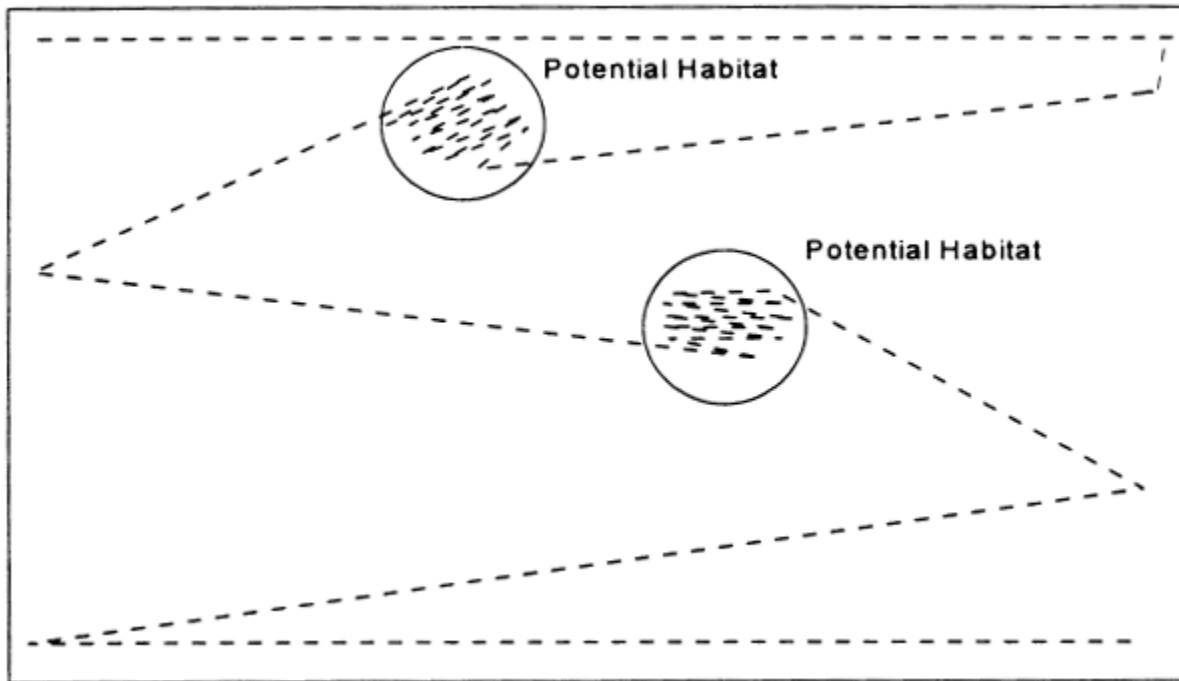


Figure 2. Intuitive Controlled Survey.

Documenting the Results of Inventory

The results of special status plant inventories should be well documented. This documentation must include as a minimum the completion and submission of Field Survey Forms and shapefiles/geodatabases of all special status plants found by BLM personnel or consultants. CNDDDB defines occurrences as being separated from other plant locations by 0.25 mile. These forms are submitted to the BLM State Botanist and to the California Natural Diversity Data Base (CNDDDB) at the following address:

CNDDDB - Dept. of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95811

Forms can be submitted electronically at: CNDDDB@dfg.ca.gov

Copies of the Field Survey Form are available from the CNDDDB at the same address. They will also provide photocopied parts of topo maps if needed.

If the inventory discovers any rare or unusual plant communities,¹ a Natural Community Field Survey Form must be completed for each such community and sent to the CNDDDB at the address above.

¹ Rare or unusual plant communities includes those communities marked with asterisks in the most current list of California plant communities recognized by the California Natural Diversity Data Base, available at: <http://www.dfg.ca.gov/biogeodata/vegcamp/pdfs/natcomlist.pdf>, and Unusual Plant Assemblages as defined in

Most special status plant inventories of public lands conducted to assess the impacts of a project are performed by consultants hired by project proponents. These inventories must meet or exceed the intensity level required for the project by BLM. Personnel conducting the inventory must meet the qualifications outlined in this document. For BLM to adequately determine the quality of third party inventories, the following information must appear in a detailed report to BLM from the consultant or project proponent:

- a. Project description, including a detailed map of the project location and study area.
- b. A written description of the biological setting, including descriptions of the plant communities found in the project area and a vegetation map. Plant communities should be described and mapped to at least the alliance level using the vegetation classification system of the California Department of Fish and Game (CDFG). A list of the alliances currently recognized by CDFG can be found at:
http://www.dfg.ca.gov/biogeodata/vegcamp/pdfs/NaturalCommunitiesList_Oct07.pdf.
 When the Manual of California Vegetation is published in 2009, the alliances recognized in that document should be used.
- c. A detailed description of the inventory methodology, including techniques and intensity of the inventory and maps showing areas actually searched. This will also include areas searched but no special status plants found.
- d. The results of the inventory.
- e. The dates of the inventory.
- f. An assessment of potential impacts and recommended mitigation measures to reduce impacts.
- g. Recommended management actions to conserve any special status plants encountered should include both actions the BLM might take, as well as actions that might be taken by the FWS (listing or delisting of T/E plants, changes in candidate status, etc.).
- h. A discussion of the significance of any special status plant occurrences found, with consideration for other nearby occurrences, and the distribution of the species as a whole.
- i. Assessments of the health, population size, and protective status of any special status plants found.
- j. A complete list of *all* plant species (not just special status species) identified within the project area, and a discussion of any range extensions discovered as a result of the inventory

the California Desert Conservation Area Plan

(http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/cdd/cdcaplan.Par.15259.File.dat/CA_Desert_.pdf) or shown on Map 6 of the California Desert Conservation Area Plan, as amended (copies on file at the BLM California State Office, the California Desert District, and each of the field offices in the California Desert District).

- k. Copies of all Field Survey Forms, for all special status plant occurrences found, or Natural Community Field Survey Forms, for any unusual communities found.
- l. The name(s) and qualifications of the persons conducting the inventory.
- m. A list of references cited, persons contacted and herbaria visited.
- n. Additional data needs.
- o. Other information as appropriate such as vegetation maps and photographs (see below).

Voucher specimens of special status plants should be collected if necessary to conclusively document the occurrence of the species and if the collection will not adversely affect the health of the population at the site. Collection of Federally listed plants on Federal lands requires a permit from the FWS. If voucher specimens are collected, they should be deposited in major recognized herbaria for future reference, preferably The University of California, Berkeley (UC), The Jepson Herbarium (JEPS), The California Academy of Sciences (CAS), or Rancho Santa Ana Botanic Garden (RSA).

Photographs should be taken of the areas inventoried, of all special status plants found, and of the habitat associated with each special status plant occurrence.

Data Collection – Data Submission

Data should be collected using a Mapping Grade GPS Receiver with an accuracy of < 3 meters Horizontal Root Mean Squared (HRMS).

All positions should be logged according to the following specifications:

- Maximum PDOP of 6
- Minimum of 5 Satellites
- Minimum elevation mask of 15 degrees
- Datum: NAD83
- Coordinate System: UTM Zone 10 or Zone 11, depending on where in California or northwestern Nevada the data is collected.
- ESRI compliant formats (Geodatabase, Coverage or Shapefile)

Metadata must be included with the data. The following must be included in the metadata:

- Project Name
- Purpose – Summary of the intentions with which the data set was developed
- Abstract Information – Brief narrative summary of the data set
- Location – What area(s) does your data cover? ie., list statewide, regions, city, county?
- Developer – Who collected the data?

Data Dictionary – A data dictionary must be used for all projects. The dictionary should include the data that is requested on the CNDDDB forms. This ensures that the botanist is collecting (electronically) the same data as is requested by DFG. This also ensures that all inventories are collecting the same level/standard of data.

GIS Support Data: BLM California State Office Downloadable Data Sources

Index Page with BLM Data Naming Rules

http://www.blm.gov/ca/pa/gis/Data_Page/Data%20Page.html

Geospatial Data Downloads

<http://www.blm.gov/ca/gis/index.html>

All data collected in and referenced to the public land survey are required to conform to this version of PLSS published on the California BLM data download page.

In addition to the local Field Office; a copy of the Data (DVD or CDROM) must be submitted directly to:

BLM California State Office
Geographic Services, W1939
Attention: Chief Mapping Sciences
2800 Cottage Way
Sacramento, CA 95825

GIS Questions: Please Call
(916) 978-4343

Qualifications of Personnel Conducting Inventories

All personnel conducting special status plant inventories must have the following:

- strong backgrounds in plant taxonomy and plant ecology
- strong background in field sampling design and methods
- knowledge of the floras of the inventory area including the special status plant species
- familiarity with natural communities of the area

These qualifications help ensure that all special status plants in the inventory area will be located, including taxa that BLM or project proponents did not predict at the start of the inventory. All survey efforts must be coordinated with the responsible BLM Field Office botanist or biologist

Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities

State of California
CALIFORNIA NATURAL RESOURCES AGENCY
Department of Fish and Game
November 24, 2009¹

INTRODUCTION AND PURPOSE

The conservation of special status native plants and their habitats, as well as natural communities, is integral to maintaining biological diversity. The purpose of these protocols is to facilitate a consistent and systematic approach to the survey and assessment of special status native plants and natural communities so that reliable information is produced and the potential of locating a special status plant species or natural community is maximized. They may also help those who prepare and review environmental documents determine when a botanical survey is needed, how field surveys may be conducted, what information to include in a survey report, and what qualifications to consider for surveyors. The protocols may help avoid delays caused when inadequate biological information is provided during the environmental review process; assist lead, trustee and responsible reviewing agencies to make an informed decision regarding the direct, indirect, and cumulative effects of a proposed development, activity, or action on special status native plants and natural communities; meet California Environmental Quality Act (CEQA)² requirements for adequate disclosure of potential impacts; and conserve public trust resources.

DEPARTMENT OF FISH AND GAME TRUSTEE AND RESPONSIBLE AGENCY MISSION

The mission of the Department of Fish and Game (DFG) is to manage California's diverse wildlife and native plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. DFG has jurisdiction over the conservation, protection, and management of wildlife, native plants, and habitat necessary to maintain biologically sustainable populations (Fish and Game Code §1802). DFG, as trustee agency under CEQA §15386, provides expertise in reviewing and commenting on environmental documents and makes protocols regarding potential negative impacts to those resources held in trust for the people of California.

Certain species are in danger of extinction because their habitats have been severely reduced in acreage, are threatened with destruction or adverse modification, or because of a combination of these and other factors. The California Endangered Species Act (CESA) provides additional protections for such species, including take prohibitions (Fish and Game Code §2050 *et seq.*). As a responsible agency, DFG has the authority to issue permits for the take of species listed under CESA if the take is incidental to an otherwise lawful activity; DFG has determined that the impacts of the take have been minimized and fully mitigated; and, the take would not jeopardize the continued existence of the species (Fish and Game Code §2081). Surveys are one of the preliminary steps to detect a listed or special status plant species or natural community that may be impacted significantly by a project.

DEFINITIONS

Botanical surveys provide information used to determine the potential environmental effects of proposed projects on all special status plants and natural communities as required by law (i.e., CEQA, CESA, and Federal Endangered Species Act (ESA)). Some key terms in this document appear in **bold font** for assistance in use of the document.

For the purposes of this document, **special status plants** include all plant species that meet one or more of the following criteria³:

¹ This document replaces the DFG document entitled "Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened and Endangered Plants and Natural Communities."

² <http://ceres.ca.gov/ceqa/>

³ Adapted from the East Alameda County Conservation Strategy available at http://www.fws.gov/sacramento/EACCS/Documents/080228_Species_Evaluation_EACCS.pdf

- Listed or proposed for listing as threatened or endangered under ESA or candidates for possible future listing as threatened or endangered under the ESA (50 CFR §17.12).
- Listed⁴ or candidates for listing by the State of California as threatened or endangered under CESA (Fish and Game Code §2050 *et seq.*). A species, subspecies, or variety of plant is **endangered** when the prospects of its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, disease, or other factors (Fish and Game Code §2062). A plant is **threatened** when it is likely to become endangered in the foreseeable future in the absence of special protection and management measures (Fish and Game Code §2067).
- Listed as rare under the California Native Plant Protection Act (Fish and Game Code §1900 *et seq.*). A plant is **rare** when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens (Fish and Game Code §1901).
- Meet the definition of rare or endangered under CEQA §15380(b) and (d). Species that may meet the definition of rare or endangered include the following:
 - ♦ Species considered by the California Native Plant Society (CNPS) to be “rare, threatened or endangered in California” (Lists 1A, 1B and 2);
 - ♦ Species that may warrant consideration on the basis of local significance or recent biological information⁵;
 - ♦ Some species included on the California Natural Diversity Database’s (CNDDB) *Special Plants, Bryophytes, and Lichens List* (California Department of Fish and Game 2008)⁶.
- Considered a **locally significant species**, that is, a species that is not rare from a statewide perspective but is rare or uncommon in a local context such as within a county or region (CEQA §15125 (c)) or is so designated in local or regional plans, policies, or ordinances (CEQA Guidelines, Appendix G). Examples include a species at the outer limits of its known range or a species occurring on an uncommon soil type.

Special status natural communities are communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. These communities may or may not contain special status species or their habitat. The most current version of the Department’s *List of California Terrestrial Natural Communities*⁷ indicates which natural communities are of special status given the current state of the California classification.

Most types of wetlands and riparian communities are considered special status natural communities due to their limited distribution in California. These natural communities often contain special status plants such as those described above. These protocols may be used in conjunction with protocols formulated by other agencies, for example, those developed by the U.S. Army Corps of Engineers to delineate jurisdictional wetlands⁸ or by the U.S. Fish and Wildlife Service to survey for the presence of special status plants⁹.

⁴ Refer to current online published lists available at: <http://www.dfg.ca.gov/biogeodata>.

⁵ In general, CNPS List 3 plants (plants about which more information is needed) and List 4 plants (plants of limited distribution) may not warrant consideration under CEQA §15380. These plants may be included on special status plant lists such as those developed by counties where they would be addressed under CEQA §15380. List 3 plants may be analyzed under CEQA §15380 if sufficient information is available to assess potential impacts to such plants. Factors such as regional rarity vs. statewide rarity should be considered in determining whether cumulative impacts to a List 4 plant are significant even if individual project impacts are not. List 3 and 4 plants are also included in the California Natural Diversity Database’s (CNDDB) *Special Plants, Bryophytes, and Lichens List*. [Refer to the current online published list available at: <http://www.dfg.ca.gov/biogeodata>.] Data on Lists 3 and 4 plants should be submitted to CNDDB. Such data aids in determining or revising priority ranking.

⁶ Refer to current online published lists available at: <http://www.dfg.ca.gov/biogeodata>.

⁷ <http://www.dfg.ca.gov/biogeodata/vegcamp/pdfs/natcomlist.pdf>. The rare natural communities are asterisked on this list.

⁸ <http://www.wetlands.com/regs/tlpg02e.htm>

⁹ U.S. Fish and Wildlife Service Survey Guidelines available at <http://www.fws.gov/sacramento/es/protocol.htm>

BOTANICAL SURVEYS

Conduct botanical surveys prior to the commencement of any activities that may modify vegetation, such as clearing, mowing, or ground-breaking activities. It is appropriate to conduct a botanical field survey when:

- Natural (or naturalized) vegetation occurs on the site, and it is unknown if special status plant species or natural communities occur on the site, and the project has the potential for direct or indirect effects on vegetation; or
- Special status plants or natural communities have historically been identified on the project site; or
- Special status plants or natural communities occur on sites with similar physical and biological properties as the project site.

SURVEY OBJECTIVES

Conduct field surveys in a manner which maximizes the likelihood of locating special status plant species or special status natural communities that may be present. Surveys should be **floristic in nature**, meaning that every plant taxon that occurs on site is identified to the taxonomic level necessary to determine rarity and listing status. “Focused surveys” that are limited to habitats known to support special status species or are restricted to lists of likely potential species are not considered floristic in nature and are not adequate to identify all plant taxa on site to the level necessary to determine rarity and listing status. Include a list of plants and natural communities detected on the site for each botanical survey conducted. More than one field visit may be necessary to adequately capture the floristic diversity of a site. An indication of the prevalence (estimated total numbers, percent cover, density, etc.) of the species and communities on the site is also useful to assess the significance of a particular population.

SURVEY PREPARATION

Before field surveys are conducted, compile relevant botanical information in the general project area to provide a regional context for the investigators. Consult the CNDDDB¹⁰ and BIOS¹¹ for known occurrences of special status plants and natural communities in the project area prior to field surveys. Generally, identify vegetation and habitat types potentially occurring in the project area based on biological and physical properties of the site and surrounding ecoregion¹², unless a larger assessment area is appropriate. Then, develop a list of special status plants with the potential to occur within these vegetation types. This list can serve as a tool for the investigators and facilitate the use of reference sites; however, special status plants on site might not be limited to those on the list. Field surveys and subsequent reporting should be comprehensive and floristic in nature and not restricted to or focused only on this list. Include in the survey report the list of potential special status species and natural communities, and the list of references used to compile the background botanical information for the site.

SURVEY EXTENT

Surveys should be comprehensive over the entire site, including areas that will be directly or indirectly impacted by the project. Adjoining properties should also be surveyed where direct or indirect project effects, such as those from fuel modification or herbicide application, could potentially extend offsite. Pre-project surveys restricted to known CNDDDB rare plant locations may not identify all special status plants and communities present and do not provide a sufficient level of information to determine potential impacts.

FIELD SURVEY METHOD

Conduct surveys using **systematic field techniques** in all habitats of the site to ensure thorough coverage of potential impact areas. The level of effort required per given area and habitat is dependent upon the vegetation and its overall diversity and structural complexity, which determines the distance at which plants can be identified. Conduct surveys by walking over the entire site to ensure thorough coverage, noting all plant taxa

¹⁰ Available at <http://www.dfg.ca.gov/biogeodata/cnddb>

¹¹ <http://www.bios.dfg.ca.gov/>

¹² Ecological Subregions of California, available at <http://www.fs.fed.us/r5/projects/ecoregions/toc.htm>

observed. The level of effort should be sufficient to provide comprehensive reporting. For example, one person-hour per eight acres per survey date is needed for a comprehensive field survey in grassland with medium diversity and moderate terrain¹³, with additional time allocated for species identification.

TIMING AND NUMBER OF VISITS

Conduct surveys in the field at the time of year when species are both evident and identifiable. Usually this is during flowering or fruiting. Space visits throughout the growing season to accurately determine what plants exist on site. Many times this may involve multiple visits to the same site (e.g. in early, mid, and late-season for flowering plants) to capture the floristic diversity at a level necessary to determine if special status plants are present¹⁴. The timing and number of visits are determined by geographic location, the natural communities present, and the weather patterns of the year(s) in which the surveys are conducted.

REFERENCE SITES

When special status plants are known to occur in the type(s) of habitat present in the project area, observe reference sites (nearby accessible occurrences of the plants) to determine whether those species are identifiable at the time of the survey and to obtain a visual image of the target species, associated habitat, and associated natural community.

USE OF EXISTING SURVEYS

For some sites, floristic inventories or special status plant surveys may already exist. Additional surveys may be necessary for the following reasons:

- Surveys are not current¹⁵; or
- Surveys were conducted in natural systems that commonly experience year to year fluctuations such as periods of drought or flooding (e.g. vernal pool habitats or riverine systems); or
- Surveys are not comprehensive in nature; or fire history, land use, physical conditions of the site, or climatic conditions have changed since the last survey was conducted¹⁶; or
- Surveys were conducted in natural systems where special status plants may not be observed if an annual above ground phase is not visible (e.g. flowers from a bulb); or
- Changes in vegetation or species distribution may have occurred since the last survey was conducted, due to habitat alteration, fluctuations in species abundance and/or seed bank dynamics.

NEGATIVE SURVEYS

Adverse conditions may prevent investigators from determining the presence of, or accurately identifying, some species in potential habitat of target species. Disease, drought, predation, or herbivory may preclude the presence or identification of target species in any given year. Discuss such conditions in the report.

The failure to locate a known special status plant occurrence during one field season does not constitute evidence that this plant occurrence no longer exists at this location, particularly if adverse conditions are present. For example, surveys over a number of years may be necessary if the species is an annual plant having a persistent, long-lived seed bank and is known not to germinate every year. Visits to the site in more

¹³ Adapted from U.S. Fish and Wildlife Service kit fox survey guidelines available at www.fws.gov/sacramento/es/documents/kitfox_no_protocol.pdf

¹⁴ U.S. Fish and Wildlife Service Survey Guidelines available at <http://www.fws.gov/sacramento/es/protocol.htm>

¹⁵ Habitats, such as grasslands or desert plant communities that have annual and short-lived perennial plants as major floristic components may require yearly surveys to accurately document baseline conditions for purposes of impact assessment. In forested areas, however, surveys at intervals of five years may adequately represent current conditions. For forested areas, refer to "Guidelines for Conservation of Sensitive Plant Resources Within the Timber Harvest Review Process and During Timber Harvesting Operations", available at <https://r1.dfg.ca.gov/portal/Portals/12/THPBotanicalGuidelinesJuly2005.pdf>

¹⁶ U.S. Fish and Wildlife Service Survey Guidelines available at http://www.fws.gov/ventura/speciesinfo/protocols_guidelines/docs/botanicalinventories.pdf

than one year increase the likelihood of detection of a special status plant especially if conditions change. To further substantiate negative findings for a known occurrence, a visit to a nearby reference site may ensure that the timing of the survey was appropriate.

REPORTING AND DATA COLLECTION

Adequate information about special status plants and natural communities present in a project area will enable reviewing agencies and the public to effectively assess potential impacts to special status plants or natural communities¹⁷ and will guide the development of minimization and mitigation measures. The next section describes necessary information to assess impacts. For comprehensive, systematic surveys where no special status species or natural communities were found, reporting and data collection responsibilities for investigators remain as described below, excluding specific occurrence information.

SPECIAL STATUS PLANT OR NATURAL COMMUNITY OBSERVATIONS

Record the following information for locations of each special status plant or natural community detected during a field survey of a project site.

- A detailed map (1:24,000 or larger) showing locations and boundaries of each special status species occurrence or natural community found as related to the proposed project. Mark occurrences and boundaries as accurately as possible. Locations documented by use of global positioning system (GPS) coordinates must include the datum¹⁸ in which they were collected;
- The site-specific characteristics of occurrences, such as associated species, habitat and microhabitat, structure of vegetation, topographic features, soil type, texture, and soil parent material. If the species is associated with a wetland, provide a description of the direction of flow and integrity of surface or subsurface hydrology and adjacent off-site hydrological influences as appropriate;
- The number of individuals in each special status plant population as counted (if population is small) or estimated (if population is large);
- If applicable, information about the percentage of individuals in each life stage such as seedlings vs. reproductive individuals;
- The number of individuals of the species per unit area, identifying areas of relatively high, medium and low density of the species over the project site; and
- Digital images of the target species and representative habitats to support information and descriptions.

FIELD SURVEY FORMS

When a special status plant or natural community is located, complete and submit to the CNDDDB a California Native Species (or Community) Field Survey Form¹⁹ or equivalent written report, accompanied by a copy of the relevant portion of a 7.5 minute topographic map with the occurrence mapped. Present locations documented by use of GPS coordinates in map and digital form. Data submitted in digital form must include the datum²⁰ in which it was collected. If a potentially undescribed special status natural community is found on the site, document it with a Rapid Assessment or Relevé form²¹ and submit it with the CNDDDB form.

VOUCHER COLLECTION

Voucher specimens provide verifiable documentation of species presence and identification as well as a public record of conditions. This information is vital to all conservation efforts. Collection of voucher specimens should

¹⁷ Refer to current online published lists available at: <http://www.dfg.ca.gov/biogeodata>. For Timber Harvest Plans (THPs) please refer to the "Guidelines for Conservation of Sensitive Plant Resources Within the Timber Harvest Review Process and During Timber Harvesting Operations", available at <https://r1.dfg.ca.gov/portal/Portals/12/THPBotanicalGuidelinesJuly2005.pdf>

¹⁸ NAD83, NAD27 or WGS84

¹⁹ <http://www.dfg.ca.gov/biogeodata>

²⁰ NAD83, NAD27 or WGS84

²¹ http://www.dfg.ca.gov/biogeodata/vegcamp/veg_publications_protocols.asp

be conducted in a manner that is consistent with conservation ethics, and is in accordance with applicable state and federal permit requirements (e.g. incidental take permit, scientific collection permit). Voucher collections of special status species (or suspected special status species) should be made only when such actions would not jeopardize the continued existence of the population or species.

Deposit voucher specimens with an indexed regional herbarium²² no later than 60 days after the collections have been made. Digital imagery can be used to supplement plant identification and document habitat. Record all relevant permittee names and permit numbers on specimen labels. A collecting permit is required prior to the collection of State-listed plant species²³.

BOTANICAL SURVEY REPORTS

Include reports of botanical field surveys containing the following information with project environmental documents:

- **Project and site description**
 - ♦ A description of the proposed project;
 - ♦ A detailed map of the project location and study area that identifies topographic and landscape features and includes a north arrow and bar scale; and,
 - ♦ A written description of the biological setting, including vegetation²⁴ and structure of the vegetation; geological and hydrological characteristics; and land use or management history.
- **Detailed description of survey methodology and results**
 - ♦ Dates of field surveys (indicating which areas were surveyed on which dates), name of field investigator(s), and total person-hours spent on field surveys;
 - ♦ A discussion of how the timing of the surveys affects the comprehensiveness of the survey;
 - ♦ A list of potential special status species or natural communities;
 - ♦ A description of the area surveyed relative to the project area;
 - ♦ References cited, persons contacted, and herbaria visited;
 - ♦ Description of reference site(s), if visited, and phenological development of special status plant(s);
 - ♦ A list of all taxa occurring on the project site. Identify plants to the taxonomic level necessary to determine whether or not they are a special status species;
 - ♦ Any use of existing surveys and a discussion of applicability to this project;
 - ♦ A discussion of the potential for a false negative survey;
 - ♦ Provide detailed data and maps for all special plants detected. Information specified above under the headings "Special Status Plant or Natural Community Observations," and "Field Survey Forms," should be provided for locations of each special status plant detected;
 - ♦ Copies of all California Native Species Field Survey Forms or Natural Community Field Survey Forms should be sent to the CNDDDB and included in the environmental document as an Appendix. It is not necessary to submit entire environmental documents to the CNDDDB; and,
 - ♦ The location of voucher specimens, if collected.

²² For a complete list of indexed herbaria, see: Holmgren, P., N. Holmgren and L. Barnett. 1990. Index Herbariorum, Part 1: Herbaria of the World. New York Botanic Garden, Bronx, New York. 693 pp. Or: <http://www.nybg.org/bsci/ih/ih.html>

²³ Refer to current online published lists available at: <http://www.dfg.ca.gov/biogeodata>.

²⁴ A vegetation map that uses the National Vegetation Classification System (<http://biology.usgs.gov/npsveg/nvcs.html>), for example *A Manual of California Vegetation*, and highlights any special status natural communities. If another vegetation classification system is used, the report should reference the system, provide the reason for its use, and provide a crosswalk to the National Vegetation Classification System.

- **Assessment of potential impacts**

- ♦ A discussion of the significance of special status plant populations in the project area considering nearby populations and total species distribution;
- ♦ A discussion of the significance of special status natural communities in the project area considering nearby occurrences and natural community distribution;
- ♦ A discussion of direct, indirect, and cumulative impacts to the plants and natural communities;
- ♦ A discussion of threats, including those from invasive species, to the plants and natural communities;
- ♦ A discussion of the degree of impact, if any, of the proposed project on unoccupied, potential habitat of the species;
- ♦ A discussion of the immediacy of potential impacts; and,
- ♦ Recommended measures to avoid, minimize, or mitigate impacts.

QUALIFICATIONS

Botanical consultants should possess the following qualifications:

- Knowledge of plant taxonomy and natural community ecology;
- Familiarity with the plants of the area, including special status species;
- Familiarity with natural communities of the area, including special status natural communities;
- Experience conducting floristic field surveys or experience with floristic surveys conducted under the direction of an experienced surveyor;
- Familiarity with the appropriate state and federal statutes related to plants and plant collecting; and,
- Experience with analyzing impacts of development on native plant species and natural communities.

SUGGESTED REFERENCES

- Barbour, M., T. Keeler-Wolf, and A. A. Schoenherr (eds.). 2007. Terrestrial vegetation of California (3rd Edition). University of California Press.
- Bonham, C.D. 1988. Measurements for terrestrial vegetation. John Wiley and Sons, Inc., New York, NY.
- California Native Plant Society. Most recent version. Inventory of rare and endangered plants (online edition). California Native Plant Society, Sacramento, CA. Online URL <http://www.cnps.org/inventory>.
- California Natural Diversity Database. Most recent version. Special vascular plants, bryophytes and lichens list. Updated quarterly. Available at www.dfg.ca.gov.
- Elzinga, C.L., D.W. Salzer, and J. Willoughby. 1998. Measuring and monitoring plant populations. BLM Technical Reference 1730-1. U.S. Dept. of the Interior, Bureau of Land Management, Denver, Colorado.
- Leppig, G. and J.W. White. 2006. Conservation of peripheral plant populations in California. *Madroño* 53:264-274.
- Mueller-Dombois, D. and H. Ellenberg. 1974. Aims and methods of vegetation ecology. John Wiley and Sons, Inc., New York, NY.
- U.S. Fish and Wildlife Service. 1996. Guidelines for conducting and reporting botanical inventories for federally listed plants on the Santa Rosa Plain. Sacramento, CA.
- U.S. Fish and Wildlife Service. 1996. Guidelines for conducting and reporting botanical inventories for federally listed, proposed and candidate plants. Sacramento, CA.
- Van der Maarel, E. 2005. Vegetation Ecology. Blackwell Science Ltd., Malden, MA.

DRAFT 04/2/2009

CALIFORNIA ENERGY COMMISSION - Recommended Biological Resources Field Survey Guidelines for Large Solar Projects

Based on the following guidelines, provide your proposed biological resource survey parameters to the Energy Commission for review and comment prior to beginning field work.

PROJECT FEATURES AND BUFFER	<i>If Sensitive Species Survey Protocols Exist (e. g. desert tortoise & Mojave ground squirrel)</i>	<i>Recommended Wildlife Surveys If Sensitive Species Survey Protocols DON'T Exist</i>	<i>Sensitive Plant Surveys</i>
<i>Project Site</i>	Follow U.S. Fish and Wildlife Service (USFWS) / California Department of Fish and Game (CDFG) survey protocols regarding transect/trap-line spacing Include incidental observations of other species when compiling and mapping ³ survey results	Transects spaced at 330' intervals (every 1/16 th of a mile) across entire site Example: A 1-square-mile project site would require 17 wildlife transects for 100% edge to edge coverage	Follow Botanical Survey Guidelines available from the California Native Plant Society (CNPS) ¹ and CDFG ² [It is insufficient to simply cite these protocols in the AFC; please provide details such as survey method(s) and date(s), surveyor name(s), and qualifications. Botanical survey methods vary depending upon species, time of year when species is most identifiable, identification ease/difficulty, site visibility, and vegetation type(s). Reference sites should be visited in advance to familiarize surveyors with target species and check phenology.]
<i>Buffer area 'within 1 mile of the project site'</i> [Per Siting Regulations Section (13) (B) - April 2007, p. 98 - Include a list of the species actually observed and those with a potential to occur within 1 mile of the project site and 1,000 feet from the outer edge of linear facility corridors.]	<ul style="list-style-type: none">Follow survey protocols out to required distance (out to 2400' for desert tortoise and possibly 4800', if USFWS required)For area beyond 2400' and out to 1 mile, complete one additional transect at 3960' (3/4 mile) and another at 5280' (1 mile)For all transects, document incidental observations of other species and include them when compiling and mapping³ survey results	4 transects covering area out to 1 mile from the project site – Transects located at 660' (1/8 th mile), 1320' (1/4 mile), 2640' (1/2 mile), and 5280' (1 mile) (See attached diagram) Map ³ survey results	Map vegetation and focus buffer area field surveys on areas likely to contain sensitive plants. Conduct 'ground truthing' to verify mapped vegetation. Map survey results in accordance with CNPS or CDFG guidelines referred to above
<i>Linear Facilities</i> [Per Siting Regulations Section (13) (B) - April 2007, p. 98 - Include a list of the species actually observed and those with a potential to occur within 1 mile of the project site and 1,000 feet from the outer edge of linear facility corridors.]	<ul style="list-style-type: none">Follow survey protocols – completed surveys within corridor and out to prescribed distance from the outer edges of the corridorEnergy Commission Siting Regulations require field survey information for area out to 1000 feet from the outer edges of a linear facility corridor. USFWS survey spacing protocols will be adequate within the 1000' survey area.For all transects, document incidental observations of other species and include them when compiling and mapping³ survey results	<ul style="list-style-type: none">Including a center line transect, additional transect spacing within a 75-100' corridor can be approximately every 30 feet on either side of the center line out to the corridor edge, however this can vary depending upon the corridor vegetation characteristicsFrom outermost edges of anticipated work corridor, complete 4 transects (0, 330', 660', and 1000') (See attached diagram)Map³ survey results	Follow Botanical Survey Guidelines available from CNPS ¹ and CDFG ² .
<i>Linear Facilities past first point of interconnect</i>	Plot California Natural Diversity Data Base (CNDDDB) data (no more than 6 months old) on base map	Plot CNDDDB data on base maps (no more than 6 months old)	Map vegetation and discuss CNDDDB sensitive plant data (no more than 6 months old) for known sensitive plant occurrences and also those sensitive plants species that are likely to occur within or near linear facility corridor

¹ CNPS Botanical Survey Guidelines can be found at <http://www.cnps.org/cnps/rareplants/inventory/guidelines.php>

² CDFG Plant Survey Guidelines can be found at <http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/guideplt.pdf>

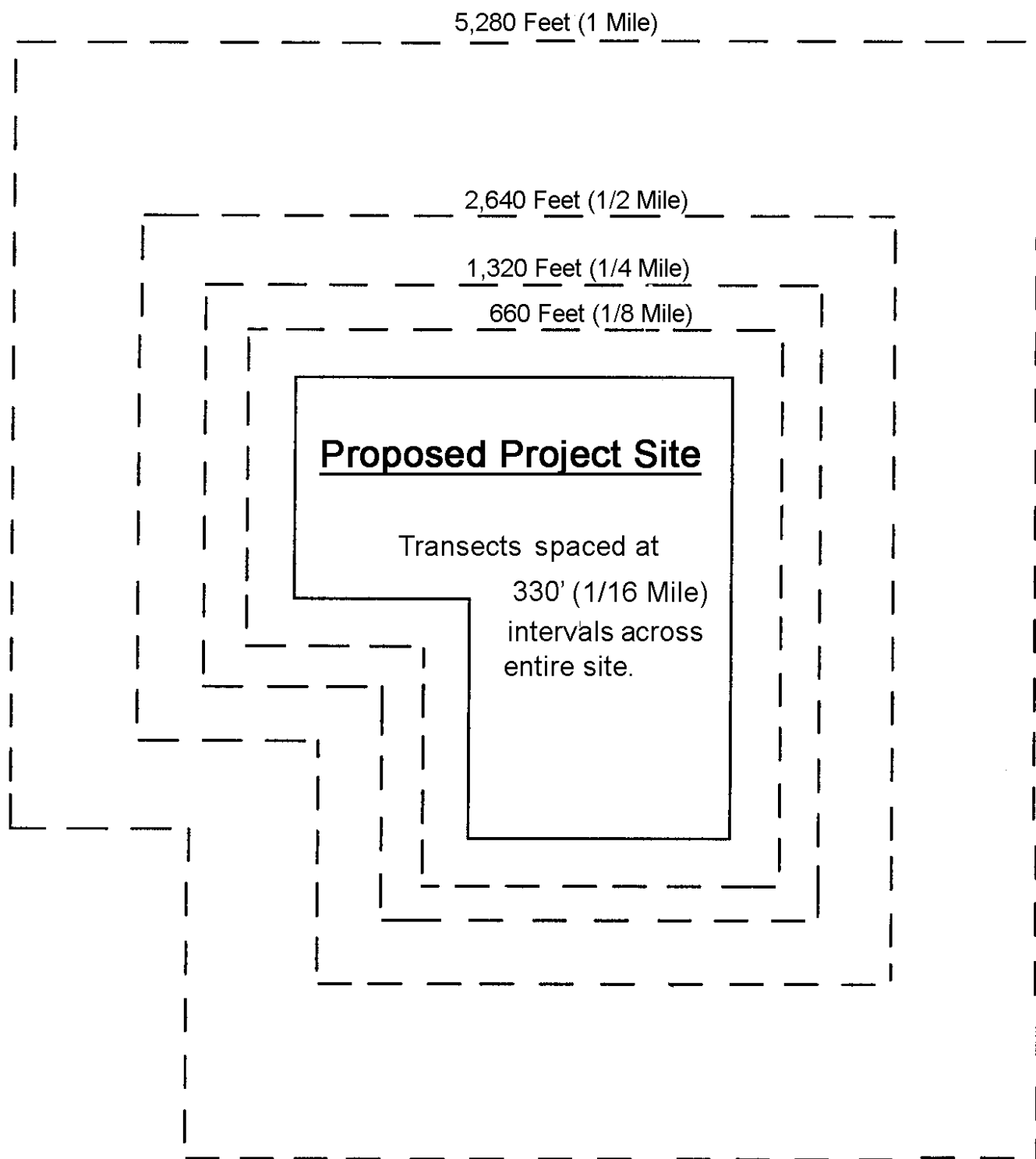
³ Map scale and format shall be in accordance with Siting Regulations Section (13) (B) (i)- April 2007, p. 98, or another scale and format deemed suitable by CEC technical staff on a case by case basis

CALIFORNIA ENERGY COMMISSION

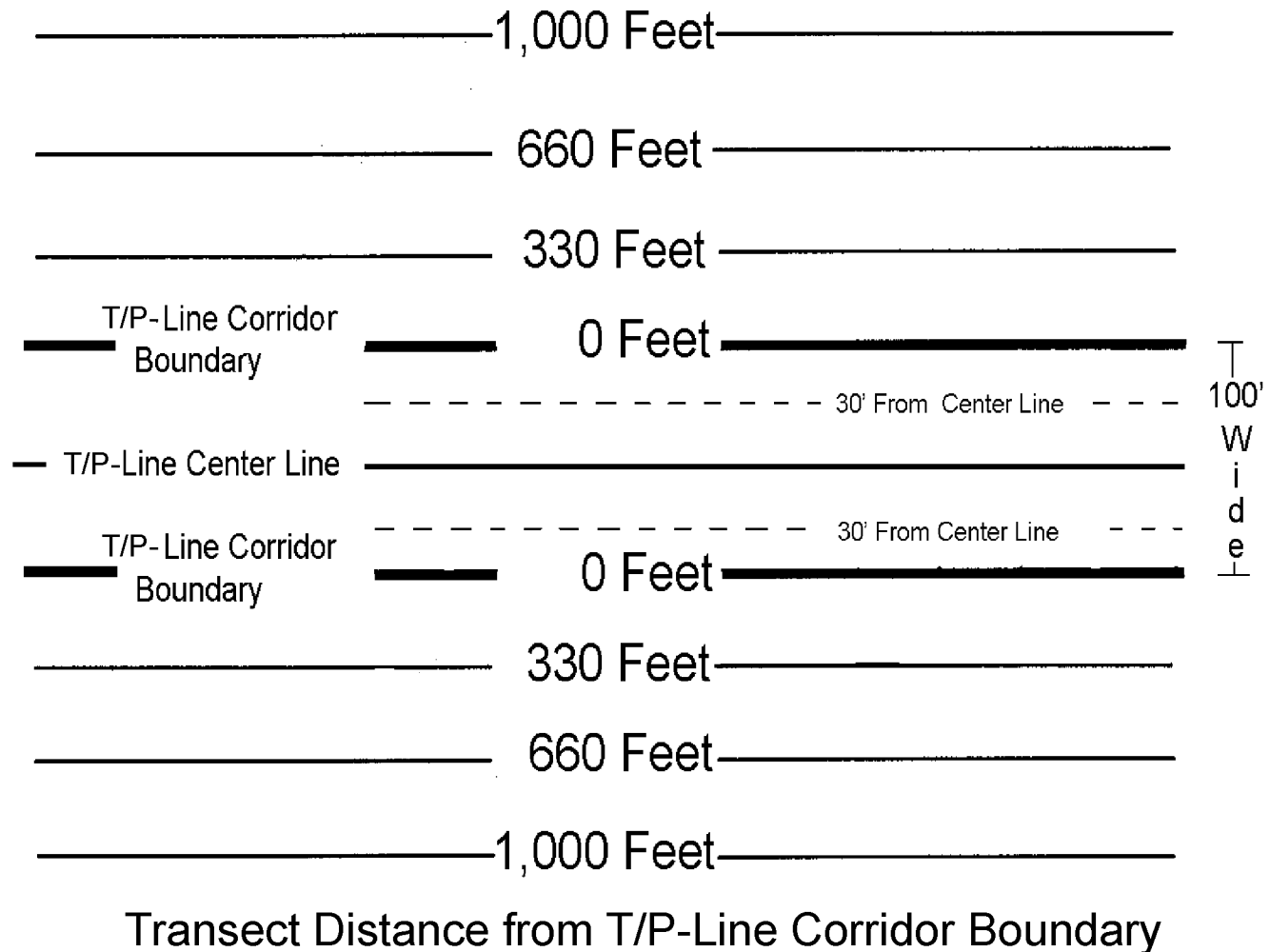
Recommended Transect Spacing for Biological Resources

Field Surveys

(Draft 05/23/2007)



CALIFORNIA ENERGY COMMISSION
Recommended Transect Spacing for Biological Resources
Field Surveys - Linear Facilities
(Draft 05/23/2007)



Template and Guidance on Preparing an Endangered Species Act Section 7 Consultation Initiation Package

2009

This document is intended to provide a general template and guidance on the type and detail of information that should be provided to initiate consultation with U.S. Fish and Wildlife Service (USFWS). This document is formatted as a general template you can follow when preparing an initiation package. This is not intended to be an exhaustive document as specific projects may require more or less information in order to initiate consultation. The amount of information is typically correlated with the complexity of the project and severity of impacts, but in any case, is at least the minimum amount of information necessary to support the conclusions of the document. Also, note that this document contains guidance on the information required to initiate formal consultation procedures with USFWS. Additional information needs may be identified during consultation. Texts in italics below are examples. Normal text is guidance. A glossary of terms (in ***bold, italic*** text) is appended.

Obviously, before you draft an initiation package, before you even know if an Endangered Species Act (ESA) consultation will be needed, you will need to have determined which species and critical habitat may be affected by the proposed action and any interrelated or interdependent actions. This “may affect” determination is the first trigger for an ESA section 7 consultation for federal actions. The first step in this determination is usually to request a list from USFWS of species and critical habitats that occur in the vicinity of your project. Alternatively, your records may already include this information or you can collect the information from websites maintained by USFWS. The next steps include reviewing the action area for proposed action (the determination of action area is described in section III below) and then reviewing the known, expected or possible occurrence of listed species and critical habitat within the action area. If the action area overlaps a species’ occurrence or critical habitat, the action “may affect” the listed species and/or critical habitat. Additional analysis (described in later sections of this document) will allow you to determine whether the exposure of the species or critical habitat to the action is likely to adversely affect the species or critical habitat.

I. INTRODUCTION

Here is an example of introductory language:

The purpose of this initiation package is to review the proposed [project name] in sufficient detail to determine to what extent the proposed action may affect any of the threatened, endangered, proposed, or candidate and designated or proposed critical habitats listed below. In addition, the following information is provided to comply with statutory requirements to use the best scientific and commercial information available when assessing the risks posed to listed and/or proposed species and designated and/or proposed critical habitat by proposed federal actions. This initiation package is prepared in accordance with legal requirements set forth under regulations implementing section 7 of the Endangered Species Act (50 CFR 402; 16

U.S.C. 1536 (c)).

Threatened, Endangered, Proposed Threatened, Proposed Endangered, or Candidate Species

Example language:

The proposed action may affect the following listed and proposed species:

*common name (Scientific name) **T***
*common name (Scientific name) **E***
*common name (Scientific name) **PT***
*common name (Scientific name) **PE***

This list should include all of the species from the species lists you obtained from USFWS. If it doesn't, include a brief explanation here and a more detailed explanation in your record to help USFWS understand your thought process for excluding a species from consideration.

Critical Habitat

Example language:

The action addressed within this document falls within critical habitat for [identify species].

II. CONSULTATION TO DATE

Consultation under the ESA consists of discussions between the action agency, the applicant (if any), and the USFWS. Consultation includes the sharing of information between all parties about the proposed action and related actions, the species and environments affected, and means of achieving project purposes while conserving the species and their habitats. Under the ESA, both formal and informal consultation can occur. The consultation process in each is similar, but formal consultation has statutory timeframes and other requirements (such as the submission of the information in this package). Informal consultation typically concludes after the action agency makes a determination that the action “***may affect, but is not likely to adversely affect***” listed species or critical habitat and USFWS concurs with this determination in writing; this process can also lead to incorporation of additional protective measures that render the project “not likely to adversely affect” listed species or designated critical habitat. Formal consultation typically occurs when the action agency makes a determination of “***may affect, likely to adversely affect***” and concludes when USFWS issue a biological opinion.

In this section, summarize any consultation that has occurred thus far. For example, prior to initiating formal consultation or requesting concurrence, agencies and applicants may engage in a period of technical assistance to discuss the project and develop avoidance, minimization, and conservation measures. Identify when consultation was requested (if not concurrent with this document). Be sure to summarize meetings, site visits and correspondence that were important to the decision-making process.

III. DESCRIPTION OF THE PROPOSED ACTION

To initiate consultation, the Federal agency must provide the following to the USFWS:

1. A description of the action to be considered;
2. A description of the specific area that may be affected by the action;
3. A description of any listed species or critical habitat that may be affected by the action;
4. A description of the manner in which the action may affect any listed species or critical habitat and an analysis of any cumulative effects;
5. Relevant reports, including any environmental impact statement, environmental assessment, or biological assessment prepared; and
6. Any other relevant available information on the action, the affected listed species, or critical habitat.

In other words, describe and specify:

WHO is going to do the action and under what authority, include the name and office of the action agency and the name and address of the applicant;

WHAT the project or action is;

WHERE the project is (refer to attached maps);

WHEN the action is going to take place, including time line and implementation schedules;

HOW the action will be accomplished, including the various activities that comprise the whole action, the methods, and the types of equipment used;

WHY the action is proposed, including its purpose and need; and

WHAT OTHER interrelated and interdependent actions are known.

Include a clear description of all conservation measures and project mitigation such as avoidance measures, seasonal restrictions, compensation, restoration/creation (on-site and in-kind, off-site and in-kind, on-site and out-of-kind, off-site and out-of-kind), and use of mitigation or conservation banks.

Here are some examples of commonly overlooked items to include in your project description:

Type of project	Restoration areas
Project location	Conservation measures
Project footprint	Compensation and set-asides
Avoidance areas	Bank ratios and amounts
Start and end times	Mitigation: what kind and who is responsible?
Construction access	Dust, erosion, and sedimentation controls
Staging/laydown areas	Whether the project is growth-inducing or facilitates growth
Construction equipment and techniques	Whether the project is part of a larger project or plan
Permanent vs. temporary impacts	What permits will need to be obtained
Duration of “temporary” impacts	

Action Area

The ***action area*** is defined as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” The action area is not based simply on the Federal action and should not be limited to the location of the Federal action. The purpose of identifying this area is to provide a boundary around the area(s) in which the ***effects of the action*** will be felt. In this area, the physical, chemical, and biological changes resulting from the proposed action and any interrelated and interdependent actions are considered in context of existing conditions and activities to determine the resulting consequence to species and critical habitat. The action area is defined by measurable or detectable changes in land, air and water, or other measurable factors that result from the proposed action and interrelated or interdependent actions. In this document, we call these measurable or detectable changes ***stressors***. Please note that when defining the limits of measurable or detectable changes, the sensitivities and capabilities of the species and their habitats should be considered.

To determine the action area, we recommend that you first break the action down into its components (*e.g.*, vegetation clearing, use of staging areas, storage areas, borrow areas, operations, maintenance, etc.). Determine the stressors that you expect from each component. For example, working in a wash may mobilize and alter downstream habitat if the existing drainage patterns are changed. Sound levels from machinery may be detectable hundreds of feet, thousands of feet, or even miles away. Use these distances when delineating the extent of your action area. We also recommend that you subsequently “reconstruct” the action to assess the combined stressors and subsidies of the components. You may find that some stressors are synergistically minimized or avoided, whereas other stressors may increase or are magnified. Finally, describe the action area, including features and habitat types. Include photographs and an area map as well as a vicinity map. The vicinity map for terrestrial projects should be at a 1:24,000 scale with the USGS quad name included.

IV. STATUS OF THE SPECIES AND CRITICAL HABITAT

The primary purpose of this section is to summarize relevant information on the biological requirements of the species, population viability (trends, abundance, distribution, etc.), and condition of critical habitat. Some of this information will come from local sources, your records, or even information provided by USFWS. You will use this information to support your determination of the likelihood of adverse effects from the action. USFWS uses this information to understand your reasoning and to supplement any additional information they consider as part of their decision to concur with your finding or to determine if the action is likely to jeopardize the listed species or result in the destruction or adverse modification of critical habitat.

Provide information on affected individuals and populations, such as presence, numbers, life history, etc. For some large or complex actions, it may also help to identify any ongoing threats, limiting factors to species viability or habitat value, and implementation of any recovery actions that have occurred. If the species has a recovery plan, that document will contain additional information on species status threats, and actions needed to recover the species.

The regulatory definition of critical habitat has been invalidated in several Federal Circuit Courts. Consequently, USFWS considers the statutory definition and purpose of critical habitat when determining if an action is likely to result in destruction or adverse modification.

Important Biological Requirements: Include aspects of the species' biology that relate to the impact of the action, such as sensitivity to or tolerance of: noise, light, heat, cold, inundation, smoke, sediments, dust, etc. For example, if the species is sensitive to loud sounds or vibration, and your project involves loud tools or equipment, reference that aspect of their biology. Include citations for all sources of information. If a species is limited to a narrow thermal range and a narrow humidity range, show where in the action area the temperatures are sufficient to support the species, where the humidity is sufficient to support the species, and where those areas overlap.

Describe habitat use in terms of breeding (spawning), feeding, and sheltering. Also discuss habitat use patterns, including seasonal use and migration (if relevant), and identify habitat needs.

Include survey information. For all monitoring and survey reports, please clearly identify how it was done, when, where, and by whom. If survey protocols were followed, reference the name and date of the protocol. If survey protocols were modified, provide an explanation of how the surveying occurred and the reasoning for modifying the protocol.

Keep it relevant. It is unnecessary to discuss biology that is totally unrelated to project impacts - *e.g.*, a detailed discussion of the species' appearance is irrelevant.

Use the best scientific and commercial information available. Use and cite publications/journal articles/agency data and technical reports. Include views of recognized experts, results from recent studies, and information on life history, population dynamics, trends and distribution.

Reference field notes, unpublished data, research in progress, etc.

If both the listed species and critical habitat are present in the action area, describe both the status of the species and the status of critical habitat; we strongly recommend that these discussions be conducted separately and in parallel. For example, one section of the biological assessment should discuss the status of the species; the following section should discuss the status of its critical habitat. For critical habitat, list the primary constituent elements of critical habitat, discuss their condition in the action area, and provide a general discussion of the conservation role and function of critical habitat in the action area.

V. ENVIRONMENTAL BASELINE AND CUMULATIVE EFFECTS

The environmental baseline section provides information which is then used along with the species and critical habitat information from the preceding section to describe the pre-action condition of the species and critical habitat in the action area that will be exposed to the stressors of the action(s) under consultation. The purpose of this section is to provide a summary of the relevant local information on the impacts that other factors (human and natural) in the action area have had on the viability of the species and value of critical habitat. These other factors may have occurred in the past and may continue to affect the species and habitat today. The cumulative effects section considers actions that are reasonably certain to affect the species and its habitat in the action area in the future.

Environmental Baseline

Provide information on past and present state, local, private, or tribal activities in the action area: specifically, the positive or negative impacts those activities have had on the species or habitat in the area in terms of abundance, reproduction, distribution, diversity, and habitat quality or function. Include the impacts of past and present federal actions as well. For continuing actions, describe those impacts (to the species under consultation) that occurred from past existence of the action—including any operational actions that may have affected the species and are expected to continue to impact the species. If both the listed species and critical habitat are present in the action area, describe the environmental baseline for both (i.e., a discussion for the species itself and another for its critical habitat, as we discussed in the previous section on the status of the species and its critical habitat).

Relevant information such as habitat conditions at the site, habitat conditions between work areas and listed species locations, surrounding land-uses, hydrology and drainage patterns, and prevailing winds and expected seasonal shifts can all be presented to provide geographical foundation for your analysis of the effects of the action and your conclusions.

Present all known and relative effects to population; *e.g.*, mining, energy transmission, hunting, recreation, illegal collecting, private wells, development, grazing, local trust programs, etc. Include impacts to the listed species in the area that you know are occurring and that are unrelated to your action - *e.g.*, road kills from off-road vehicle use, poaching, trespass, etc.

Cumulative effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the proposed action are not considered in this analysis because they will be subject to separate consultation pursuant to section 7 of the Act. (Note: Cumulative effects are defined differently under ESA and under NEPA. Be careful not to mix them up.) Describe the impacts of these cumulative effects in terms of abundance, reproduction, distribution, diversity, and habitat quality or function.

VI. EFFECTS OF THE ACTION

The purpose of this section is to document your analysis of the potential impacts the proposed action will have on species and/or critical habitats. This analysis has two possible conclusions for listed species and designated critical habitat:

- (1) May Affect, Not Likely to Adversely Affect** – the appropriate conclusion when effects on a listed species or critical habitat are expected to be *discountable*, *insignificant*, or completely *beneficial*.

Beneficial effects – contemporaneous positive effects without any adverse effects

Insignificant effects – relate to the size of the impact and should never reach the scale where take would occur. Section 9 of the Endangered Species Act and its implementing regulations define take to mean to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. USFWS regulations (50 CFR 17.3) define harm to include significant habitat modification or degradation which actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harassment is defined by USFWS as an intentional or negligent action that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering.

Discountable effects – those that are extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur.

- (2) May Affect, Likely to Adversely Affect** – the appropriate finding if *any* adverse effect may occur to listed species or critical habitat as a direct or indirect result of the proposed action and the effect is not discountable, insignificant, or beneficial.

The effects analysis includes an assessment of:

Direct and indirect effects (including stressors and benefits) of the action(s) under consultation, including conservation and minimization measures;

Direct and indirect effects (including stressors and benefits) of interrelated or interdependent actions; and

Cumulative effects.

All of these effects are considered with regard to the environmental baseline of the species and its critical habitat in the action area.

Under the ESA, direct effects are those that are caused by the action(s) and occur at the time of the action(s), and indirect effects are those that are caused by the action(s) and are later in time, but are still reasonably certain to occur. The critical issue is not whether something is a direct or indirect effect, but that the scope of the analysis considers all stressors that are likely to occur as a result of the action.

Based on the various components of your action that you used to determine the extent of the action area, this analysis assesses the potential stressors resulting from each component and predicts the likely responses species and critical habitat that are exposed to those stressors and subsidies will have. As in the status and environmental baseline sections, discuss the effects of the action on both the species and critical habitat in a separate and parallel manner.

To determine a species' and/or habitat's probable response to an action, you must evaluate the magnitude and scope of the species and/or habitat's exposure to the stressors resulting from the action. The overlap between the species and critical habitat and the stressors resulting from the action determined which species and habitat the action "may affect." Now, this overlap is further examined to determine the nature of the exposure to determine the response or range of responses that are likely to occur. This assessment is similar to evaluations of the effects of a drug or toxin on a living creature. At certain levels of exposure to the chemical, the plant or animal may show no response. At higher doses, the plant or animal may exhibit illness or diseases. At even higher doses or in doses combined with other factors, the animal may die. These responses (which can vary from no response through death) have different consequences on the short and long term fitness of the plant or animal. Our analysis is especially concerned with responses that reduce a plant or animal's reproductive success, growth, or life span.

Your conclusions of "not likely to adversely affect" or "likely to adversely affect" are based in large part on the responses you predict will occur based on the best scientific and commercial information.

To begin your prediction of responses, here is a basic set of questions you might answer:

1. What are the specific stressors causing the exposure?
2. Where would the exposure to the stressors occur?
3. When would the exposure to stressors occur?
4. How long would the exposure to stressors occur?
5. What is the frequency of exposure to stressors?
6. What is the intensity of exposure to stressors?
7. How many individuals would be exposed?
8. Which populations do those individuals represent?

9. What life stages would be exposed?

For critical habitat, the questions would be similar but would focus on the primary constituent elements of critical habitat.

Remember that exposure to a stressor is not always direct. For example, in some cases individuals of a species may be directly exposed to the sediment mobilized during construction. However, in other cases, individuals of the species would be exposed indirectly when sediment mobilized during construction settles out in downstream areas, rendering those areas unusable for later spawning or foraging.

Here are some examples of stressors you should address:

- Exposure to abiotic factors affecting land, air, or water
- Exposure to biotic factors affecting species behavior
- Spatial or temporal changes in primary constituent elements of critical habitat
- Loss or gain of habitat--direct and indirect
- Fragmentation of habitat
- Loss or gain of forage and/or foraging potential
- Loss or gain of shelter/cover
- Loss or gain of access through adjacent habitat/loss of corridors

Once you have examined the details of the exposure of species or critical habitat to an action, the next step is to determine the potential response or range of responses the exposed individuals or primary constituent elements of critical habitat will have to those levels and types of exposure.

This is where the use of the best scientific and commercial information available becomes crucial. Your analysis must take this information into consideration and the resulting document must reflect the use of this information and your reasoning and inference based on that information. Bear in mind that this analysis may not be the final word on the expected responses as further consultation with USFWS may refine this analysis.

Be sure to describe the expected responses clearly and focus your analysis towards determining if any of the possible responses will result in the death or injury of individuals, reduced reproductive success or capacity, or the temporary or permanent blockage or destruction of biologically significant habitats (*e.g.*, foraging, spawning, or lekking grounds; migratory corridors, etc.). Any of these above responses are likely to qualify as adverse effects. If the available information indicates that no observable response is expected from the levels and types of exposure, the action may be unlikely to adversely affect a species or critical habitat. However, remember that no observable response may actually mask an invisible internal response such as increased stress hormone levels, elevated heart rate, etc. Depending on the fitness of the exposed individual and the surrounding environment (including other threats), these “invisible” responses may lead to more serious consequences. We recommend working with your USFWS contact to determine the appropriate conclusion.

Don't forget to consider:

Individual responses based on the species' biological requirements and sensitivity to exposure;

The combined effects of existing threats (baseline) and exposure;

Exposure and response of species and critical habitat to interrelated and interdependent actions; and

The combined stressors of the components of the action.

Any actions that are likely to result in the incidental take of individuals of a listed species are automatically considered "likely to adversely affect."

Understand and avoid common flaws in developing an effect determination. Basing your effects determination on the presumption that individuals are not present or that the individuals of the listed species can find suitable habitat elsewhere when work starts can cause projects to be stalled or delayed.

Here are some examples of effects:

- Loss of habitat--direct and indirect
- Mortality
- Disturbance
- Disrupted reproduction and/or loss of reproduction
- Loss of forage and/or foraging potential
- Loss of shelter/cover
- Loss of access through adjacent habitat/loss of corridors
- Noise/light during construction
- Noise/light after construction
- Fragmentation of habitat
- Urbanization induced or facilitated by the action

Analysis of alternate actions

This analysis is required for actions that involve preparation of an environmental impact statement. For all other actions, a summary of alternatives discussed in other environmental documents is useful to understanding the purposes of the action and other feasible (or infeasible) methods to accomplish that purpose.

VII. CONCLUSION

This is where you put your overall effect determination after you have analyzed the exposure and response of species and habitat to the stressors resulting from the proposed action and interrelated or interdependent actions. Effect determinations must be based on a sound reasoning from exposure to response and must be consistent with types of actions in the project description, the biology in the species accounts, the habitat status and condition, changes to the existing environment, and the best scientific and commercial information available.

Again, the two potential conclusions for
listed species are:

Not likely to adversely affect species

Likely to adversely affect species

The two potential conclusions for **designated
critical habitat** are:

Not likely to adversely affect critical habitat

Likely to adversely affect critical habitat

Include the basis for the conclusion, such as discussion of any specific measures or features of the project that support the conclusion and discussion of species expected response, status, biology, or baseline conditions that also support conclusion.

If you make a “no effect” determination for another species or critical habitat, it doesn’t need to be in the assessment you send to USFWS. Because you might have to defend that determination, keep the documentation of your reasoning in your administrative record. However, providing information on that species or critical habitat and your “no effect” determination in the biological assessment would show USFWS that you have considered this species or critical habitat and possibly save some questions from us.

VIII. LIST OF DOCUMENTS

Provide a list of the documents that have bearing on the project or the consultation; this includes relevant reports, including any environmental impact statements, environmental assessment, or biological assessment prepared for the project. Include all planning documents as well as the documents prepared in conformance with state environmental laws

IX. LITERATURE CITED

We are all charged with using the best scientific and commercial information available. To demonstrate you did this, it is a good idea to keep copies of search requests in your record. If you used a personal communication as a reference, include the contact information (name, address, phone number, affiliation) in your record.

X. LIST OF CONTACTS/CONTRIBUTORS/PREPARERS

Please include contact information for contributors and preparers as well as local experts contacted for species or habitat information.

GLOSSARY

Action Agency – the federal agency that proposes to “authorize, fund, or carry out” an action that will be subject to ESA section 7 consultation.

Action Area -all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

Cumulative Effects – are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur in the action area of the Federal action subject to consultation.

Effects of the Action – refers to the direct and *indirect effects* of an action on the species or critical habitat, together with the effects of other activities that are *interrelated* or *interdependent* with that action, that will be added to the environmental baseline.

Indirect Effects - Indirect effects are those that are caused by the action(s) and are later in time, but are still reasonably certain to occur

Interrelated Actions - Interrelated actions are those that are part of a larger action and depend on the larger action for their justification; *i.e.* the action under consultation and related actions would not occur “but for” a larger action.

Interdependent Actions - Interdependent actions are those that have no significant independent utility apart from the action that is under consideration; *i.e.* other actions would not occur “but for” the action under consultation.

Environmental Baseline – includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions that are contemporaneous with the consultation in process.

Likely to jeopardize the continued existence of – to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

May Affect, Not Likely to Adversely Affect – the appropriate conclusion when effects on a listed species or critical habitat are expected to be *discountable*, *insignificant*, or completely *beneficial*.

Beneficial effects – contemporaneous positive effects without any adverse effects

Insignificant effects – relate to the size of the impact and should never reach the scale where take would occur.

Discountable effects – those that are extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur.

May Affect, Likely to Adversely Affect – the appropriate finding if any adverse effects may occur to listed species or critical habitat as a direct or indirect result of the proposed action.

Common Flaws in Developing an Effect Determination

USFWS concurrence with a “not likely to adversely affect” determination is contingent upon the biological assessment providing an adequate justification for the effect determination. Quite often, USFWS must decide whether to concur with an effect determination without adequate supporting information. The determination may be correct, but USFWS cannot make the “leap of faith” to accept it without supporting evidence and rationale. This is an important point that often delays the informal consultation process.

Quite frequently, effect determinations are not justified in the assessment. The assessment should lead the reviewer through a discussion of effects to a logical, well-supported conclusion. For example, certain arguments might justify a “may affect, but not likely to adversely affect” call, but do not support the often-chosen “no effect” determination. It is important to remember that “no effect” means literally *no effect*, not a *small* effect or an effect that is *unlikely* to occur. If effects are insignificant (in size) or discountable (*extremely unlikely*), a “may affect, but not likely to adversely affect” determination is probably appropriate. Examples of arguments commonly used to justify effect determination follow.

Occasionally, we receive requests for concurrence that removal of habitat or disturbance of individuals is “not likely to adversely affect” or “no effect” because individuals can simply go elsewhere. When the argument is used, some rationale must be provided to indicate the individuals of the species are unlikely to be adversely affected by loss of foraging, sheltering, breeding, or any other habitat that is necessary for the individuals to carry out their life functions. In any case, a “no effect” call in these situations is usually inappropriate. The species will be affected but, depending on the situation, perhaps not adversely so.

On other occasions, we receive requests for concurrence with a “not likely to adversely affect” determination because the species is not known to occur in an area. Absent any other supporting information, USFWS generally cannot concur with such a determination. This point emphasizes the importance of conducting thorough species-specific surveys at the appropriate time of the year. Your local USFWS office can provide technical assistance regarding survey protocols.

You should also avoid basing your “not likely to adversely affect” determination on a provision that says “formal consultation will be initiated if the species is found during construction.” Although we understand that this situation could occur even if all parties consulted in good faith, a request for concurrence should never rely on future consultations in lieu of a complete analysis. Consulting after the project has begun can result in substantial delays in implementation of the project, additional costs, and heightened pressure on all involved parties.

Finally, do not assume that the USFWS reviewer is familiar with the project, its location, and its potential impact on listed species or critical habitat. Follow the guidance in this document and the implementing regulations fully for every action upon which you consult. Fully documenting your conclusions for each action will ultimately save everyone time and result in a better, more complete analysis upon which to base our decisions.

ATTACHMENT II: Management/Mitigation and Drainage Program Preparation Guidance

Burrowing Owl Survey Protocol and Mitigation Guidelines

Protecting Burrowing Owls at Construction Sites in Nevada's Mojave Desert Region

Staff Report on Burrowing Owl Mitigation

Preparing Raven Monitoring and Control Plans (Draft)

Preparing Revegetation Plans for Mitigating Vegetated State Waters

Preparing Special-Status Plant Avoidance/Mitigation Plans

Preparing Weed Management Plans

Protecting California Desert Region Bighorn Sheep

Swainson's Hawk Survey Protocols, Impact Avoidance, and Minimization Measures for Renewable Energy Projects in the Antelope Valley of Los Angeles and Kern Counties, California

Developing Channel Maintenance Programs for Engineered Drainages

BURROWING OWL SURVEY PROTOCOL
AND MITIGATION GUIDELINES

Prepared by:

The California Burrowing Owl Consortium

April 1993

INTRODUCTION

The California Burrowing Owl Consortium developed the following Survey Protocol and Mitigation Guidelines to meet the need for uniform standards when surveying burrowing owl (*Speotyto cunicularia*) populations and evaluating impacts from development projects. The California Burrowing Owl Consortium is a group of biologists in the San Francisco Bay area who are interested in burrowing owl conservation. The following survey protocol and mitigation guidelines were prepared by the Consortium's Mitigation Committee. These procedures offer a decision-making process aimed at preserving burrowing owls in place with adequate habitat.

California's burrowing owl population is clearly in peril and if declines continue unchecked the species may qualify for listing. Because of the intense pressure for development of open, flat grasslands in California, resource managers frequently face conflicts between owls and development projects. Owls can be affected by disturbance and habitat loss, even though there may be no direct impacts to the birds themselves or their burrows. There is often inadequate information about the presence of owls on a project site until ground disturbance is imminent. When this occurs there is usually insufficient time to evaluate impacts to owls and their habitat. The absence of standardized field survey methods impairs adequate and consistent impact assessment during regulatory review processes, which in turn reduces the possibility of effective mitigation.

These guidelines are intended to provide a decision-making process that should be implemented wherever there is potential for an action or project to adversely affect burrowing owls or the resources that support them. The process begins with a four-step survey protocol to document the presence of burrowing owl habitat, and evaluate burrowing owl use of the project site and a surrounding buffer zone. When surveys confirm occupied habitat, the mitigation measures are followed to minimize impacts to burrowing owls, their burrows and foraging habitat on the site. These guidelines emphasize maintaining burrowing owls and their resources in place rather than minimizing impacts through displacement of owls to an alternate site.

Each project and situation is different and these procedures may not be applicable in some circumstances. Finally, these are not strict rules or requirements that must be applied in all situations. They are guidelines to consider when evaluating burrowing owls and their habitat, and they suggest options for burrowing owl conservation when land use decisions are made.

Section 1 describes the four phase Burrowing Owl Survey Protocol. Section 2 contains the Mitigation Guidelines. Section 3 contains a discussion of various laws and regulations that protect burrowing owls and a list of references cited in the text.

We have submitted these documents to the California Department of Fish and Game (CDFG) for review and comment. These are untested procedures and we ask for your comments on improving their usefulness.

SECTION 1 BURROWING OWL SURVEY PROTOCOL

PHASE I: HABITAT ASSESSMENT

The first step in the survey process is to assess the presence of burrowing owl habitat on the project site including a 150-meter (approx. 500 ft.) buffer zone around the project boundary (Thomsen 1971, Martin 1973).

Burrowing Owl Habitat Description

Burrowing owl habitat can be found in annual and perennial grasslands, deserts, and scrublands characterized by low-growing vegetation (Zarn 1974). Suitable owl habitat may also include trees and shrubs if the canopy covers less than 30 percent of the ground surface. Burrows are the essential component of burrowing owl habitat: both natural and artificial burrows provide protection, shelter, and nests for burrowing owls (Henny and Blus 1981). Burrowing owls typically use burrows made by fossorial mammals, such as ground squirrels or badgers, but also may use man-made structures, such as cement culverts; cement, asphalt, or wood debris piles; or openings beneath cement or asphalt pavement.

Occupied Burrowing Owl Habitat

Burrowing owls may use a site for breeding, wintering, foraging, and/or migration stopovers. Occupancy of suitable burrowing owl habitat can be verified at a site by an observation of at least one burrowing owl, or, alternatively, its molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance. Burrowing owls exhibit high site fidelity, reusing burrows year after year (Rich 1984, Feeney 1992). A site should be assumed occupied if at least one burrowing owl has been observed occupying a burrow there within the last three years (Rich 1984).

The Phase II burrow survey is required if burrowing owl habitat occurs on the site. If burrowing owl habitat is not present on the project site and buffer zone, the Phase II burrow survey is not necessary. A written report of the habitat assessment should be prepared (Phase IV), stating the reason(s) why the area is not burrowing owl habitat.

PHASE II: BURROW SURVEY

1. A survey for-burrows and owls should be conducted by walking through suitable habitat over the entire project site and in areas within 150 meters (approx 500 ft.) of the project impact zone. This 150-meter buffer zone is included to account for adjacent burrows and foraging habitat outside the project area and impacts from factors such as noise and vibration due to heavy equipment which could impact resources outside the project area.

2. Pedestrian survey transects should be spaced to allow 100 percent visual coverage of the ground surface. The distance between transect center lines should be no more than 30 meters (approx. 100 ft.), and should be reduced to account for differences in terrain, vegetation density, and ground surface visibility. To efficiently survey projects larger than 100 acres, it is recommended that two or more surveyors conduct concurrent surveys. Surveyors should maintain a minimum distance of 50 meters (approx. 160 ft.) from any owls or occupied burrows. It is important to minimize disturbance near occupied burrows during all seasons.
3. If burrows or burrowing owls are recorded on the site, a map should be prepared of the burrow concentration areas. A breeding season survey and census (Phase III) of burrowing owls is the next step required.
4. Prepare a report (Phase IV) of the burrow survey stating whether or not burrows are present.
5. A preconstruction survey may be required by project-specific mitigations no more than 30 days prior to ground disturbing activity.

PHASE III: BURROWING OWL SURVEYS, CENSUS AND MAPPING

If the project site contains burrows that could be used by burrowing owls, then survey efforts should be directed towards determining owl presence on the site. Surveys in the breeding season are required to describe if, when, and how the site is used by burrowing owls. If no owls are observed using the site during the breeding season, a winter survey is required.

Survey Methodology

A complete burrowing owl survey consists of four site visits. During the initial site visit examine burrows for owl sign and map the locations of occupied burrows. Subsequent observations should be conducted from as many fixed points as necessary to provide visual coverage of the site using spotting scopes or binoculars. It is important to minimize disturbance near occupied burrows during all seasons. Site visits must be repeated on four separate days. Conduct these visits from two hours before sunset to one hour after or from one hour before to two hours after sunrise. Surveys should be conducted during weather that is conducive to observing owls outside their burrows. Avoid surveys during heavy rain, high winds (> 20 mph), or dense fog.

Nesting Season Survey. The burrowing owl nesting season begins as early as February 1 and continues through August 31 (Thomsen 1971, Zam 1974). The timing of nesting activities may vary with latitude and climatic conditions. If possible, the nesting season survey should be conducted during the peak of the breeding season, between April 15 and July 15. Count and map all burrowing owl sightings, occupied burrows, and burrows with owl sign. Record numbers of pairs and juveniles, and behavior such as courtship and copulation. Map the approximate territory boundaries and foraging areas if known.

Survey for Winter Residents (non-breeding owls). Winter surveys should be conducted between December 1 and January 31, during the period when wintering owls are most likely to be present. Count and map all owl sightings, occupied burrows, and burrows with owl sign.

Surveys Outside the Winter and Nesting Seasons. Positive results, (i.e., owl sightings)- outside of the above survey periods would be adequate to determine presence of owls on site. However, results of these surveys may be inadequate for mitigation planning because the numbers of owls and their pattern of distribution may change during winter and nesting seasons. Negative results during surveys outside the above periods are not conclusive proof that owls do not use the site.

Preconstruction Survey. A preconstruction survey may be required by project-specific mitigations and should be conducted no more than 30 days prior to ground disturbing activity.

PHASE IV: RESOURCE SUMMARY, WRITTEN REPORT

A report should be prepared for CDFG that gives the results of each Phase of the survey protocol, as outlined below.

Phase I: Habitat Assessment

1. Date and time of visit(s) including weather and visibility conditions; methods of survey.
2. Site description including the following information: location, size, topography, vegetation communities, and animals observed during visit(s).
3. An assessment of habitat suitability for burrowing owls and explanation.
4. A map of the site.

Phase II: Burrow Survey

1. Date and time of visits including weather and visibility conditions; survey methods including transect spacing.
2. A more detailed site description should be made during this phase of the survey protocol including a partial plant list of primary vegetation, location of nearest freshwater (on or within one mile of site), animals observed during transects.
3. Results of survey transects including a map showing the location of concentrations of burrow(s) (natural or artificial) and owl(s), if present.

Phase III: Burrowing Owl Surveys, Census and Mapping

1. Date and time of visits including weather and visibility conditions; survey methods including transect spacing.
2. Report and map the location of all burrowing owls and owl sign. Burrows occupied by owl(s) should be mapped indicating the number of owls at each burrow. Tracks, feathers, pellets, or other items (prey remains, animal scat) at burrows should also be reported.
3. Behavior of owls during the surveys should be carefully recorded (from a distance) and reported. Describe and map areas used by owls during the surveys. Although not required, all behavior is valuable to document including feeding, resting, courtship, alarm, territorial, parental, or juvenile behavior.
4. Both winter and nesting season surveys should be summarized. If possible include information regarding productivity of pairs, seasonal pattern of use, and include a map of the colony showing territorial boundaries and home ranges.
5. The historical presence of burrowing owls on site should be documented, as well as the source of such information (local bird club, Audubon society, other biologists, etc.).

Burrowing: Owl Survey Protocol

April 1993

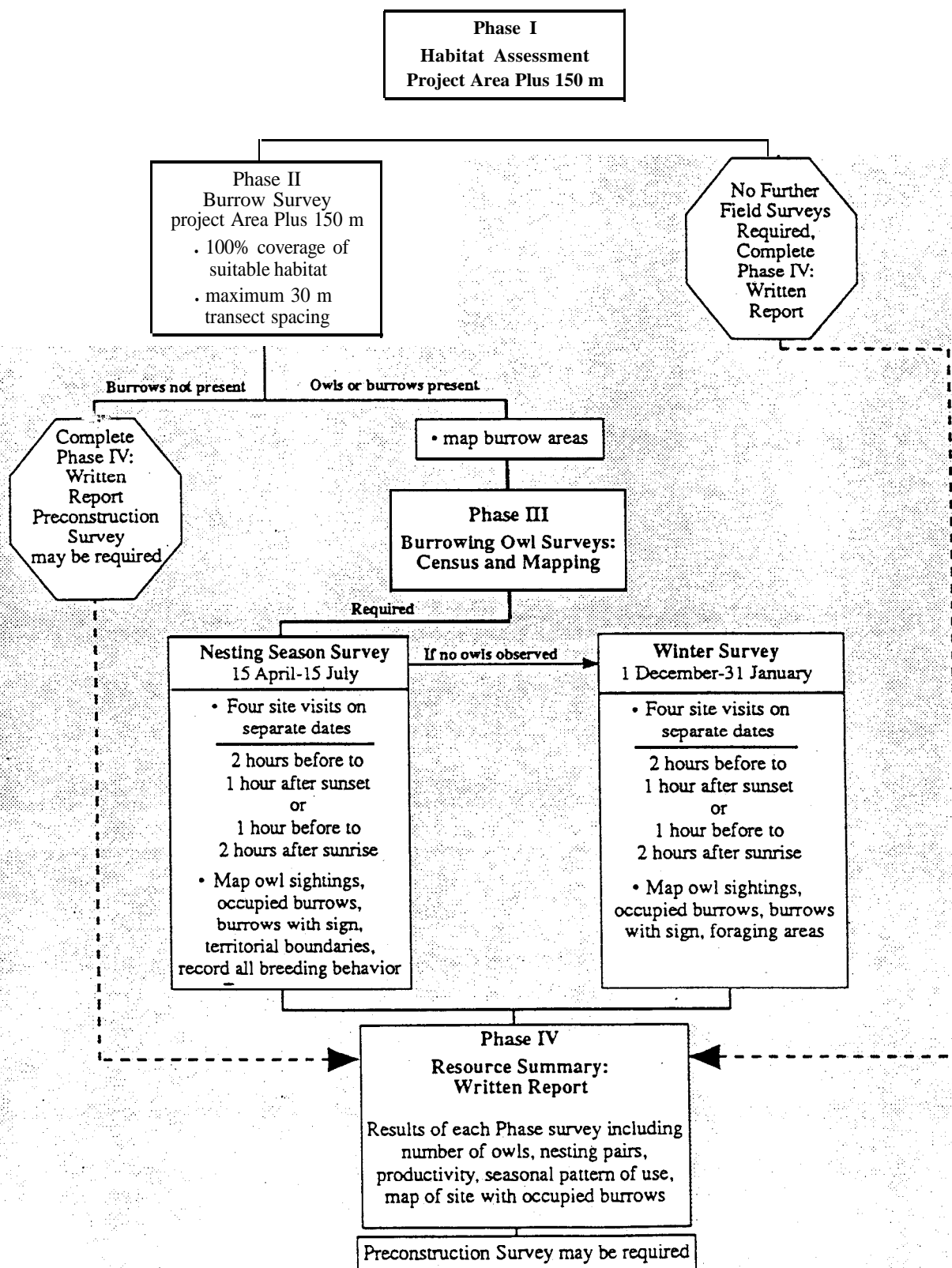


Figure 1.

SECTION 2 BURROWING OWL MITIGATION GUIDELINES

The objective of these mitigation guidelines is to minimize impacts to burrowing owls and the resources that support viable owl populations. These guidelines are intended to provide a decision-making process that should be implemented wherever there is potential for an action or project to adversely affect burrowing owls or their resources. The process begins with a four-step survey protocol (see *Burrowing Owl Survey Protocol*) to document the presence of burrowing owl habitat, and evaluate burrowing owl use of the project site and a surrounding buffer zone. When surveys confirm occupied habitat, the mitigation measures described below are followed to minimize impacts to burrowing owls, their burrows and foraging habitat on the site. These guidelines emphasize maintaining burrowing owls and their resources in place rather than minimizing impacts through displacement of owls to an alternate site.

Mitigation actions should be carried out prior to the burrowing owl breeding season, generally from February 1 through August 31 (Thomsen 1971, Zarn 1974). The timing of nesting activity may vary with latitude and climatic conditions. Project sites and buffer zones with suitable habitat should be resurveyed to ensure no burrowing owls have occupied them in the interim period between the initial surveys and ground disturbing activity. Repeat surveys should be conducted not more than 30 days prior to initial ground disturbing activity.

DEFINITION OF IMPACTS

1. Disturbance or harassment within 50 meters (approx. 160 ft.) of occupied burrows.
2. Destruction of burrows and burrow entrances. Burrows include structures such as culverts, concrete slabs and debris piles that provide shelter to burrowing owls.
3. Degradation of foraging habitat adjacent to occupied burrows.

GENERAL CONSIDERATIONS

1. Occupied burrows should not be disturbed during the nesting season, from February 1 through August 31, unless the Department of Fish and Game verifies that the birds have not begun egg-laying and incubation or that the juveniles from those burrows are foraging independently and capable of independent survival at an earlier date.
2. A minimum of 6.5 acres of foraging habitat, calculated on a 100-m (approx. 300 ft.) foraging radius around the natal burrow, should be maintained per pair (or unpaired resident single bird) contiguous with burrows occupied within the last three years (Rich 1984, Feeney 1992). Ideally, foraging habitat should be retained in a long-term conservation easement.

3. When destruction of occupied burrows is unavoidable, burrows should be enhanced (enlarged or cleared of debris) or created (by installing artificial burrows) in a ratio of 1:1 in adjacent suitable habitat that is contiguous with the foraging habitat of the affected owls.
4. If owls must be moved away from the disturbance area, passive relocation (see below) is preferable to trapping. A time period of at least one week is recommended to allow the owls to move and acclimate to alternate burrows.
5. The mitigation committee recommends monitoring the success of mitigation programs as required in Assembly Bill 3180. A monitoring plan should include mitigation success criteria and an annual report should be submitted to the California Department of Fish and Game.

AVOIDANCE

Avoid Occupied Burrows

No disturbance should occur within 50 m (approx. 160 ft.) of occupied burrows during the non-breeding Season of September 1 through January 31 or within 75 m (approx. 250 ft.) during the breeding Season of February 1 through August 31. Avoidance also requires that a minimum of 6.5 acres of foraging habitat be preserved contiguous with occupied burrow sites for each pair of breeding burrowing owls (with or without dependent young) or single unpaired resident bird (Figure 2).

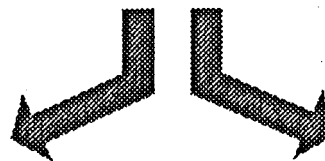
MITIGATION FOR UNAVOIDABLE IMPACTS

On-site Mitigation

On-site passive relocation should be implemented if the above avoidance requirements cannot be met. Passive relocation is defined as encouraging owls to move from occupied burrows to alternate natural or artificial burrows that are beyond 50 m from the impact zone and that are within or contiguous to a minimum of 6.5 acres of foraging habitat for each pair of relocated owls (Figure 3). Relocation of owls should only be implemented during the non-breeding season. On-site habitat should be preserved in a conservation easement and managed to promote burrowing owl use of the site.

Owls should be excluded from burrows in the immediate impact zone and within a 50 m (approx. 160 ft.) buffer zone by installing one-way doors in burrow entrances: One-way doors should be left in place 48 hours to insure owls have left the burrow before excavation. One alternate natural or artificial burrow should be provided for each burrow that will be excavated in the project impact zone. The project area should be monitored daily for one week to confirm owl use of alternate burrows before excavating burrows in the immediate impact zone. Whenever possible, burrows should be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe or burlap bags should be inserted into the tunnels

AVOIDANCE



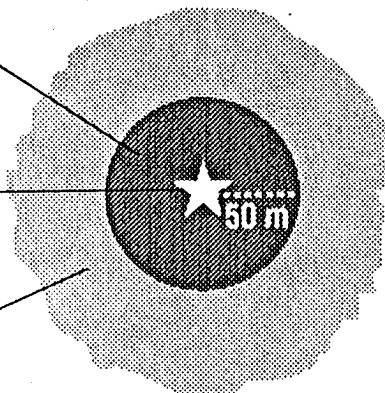
Non-breeding season

1 Sept. - 31 Jan.

No impacts within
50 m of occupied
burrow

Occupied
burrow

Maintain
at least 6.5 acres
foraging habitat



Breeding season

1 Feb. - 31 Aug.

No impacts within
75 m of occupied
burrow

Occupied
burrow

Maintain
at least 6.5 acres
foraging habitat

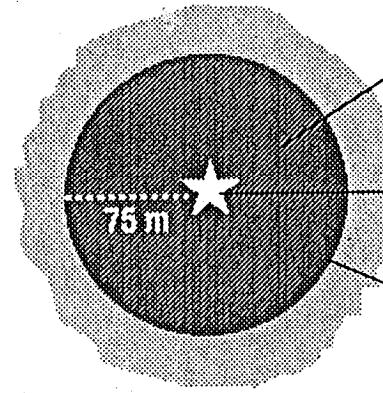


Figure 2. Burrowing owl mitigation guidelines.

ON-SITE MITIGATION IF AVOIDANCE NOT MET

(More than 6.5 acres suitable habitat available)

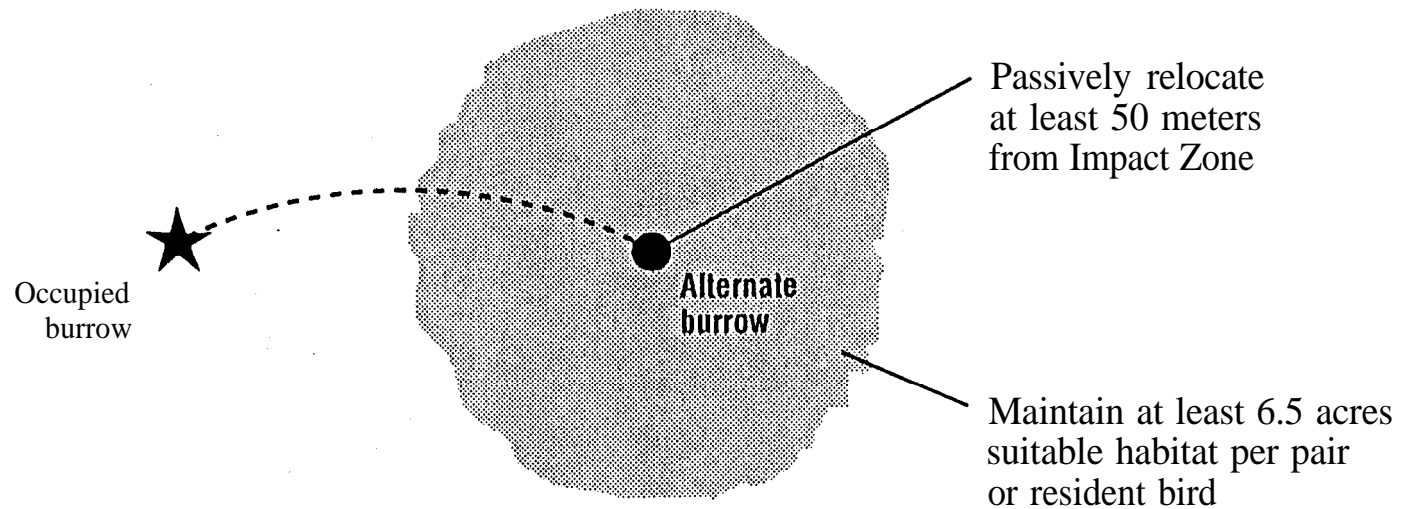


Figure 3. Burrowing owl mitigation guidelines.

during excavation to maintain an escape route for any animals inside the burrow.

Off-site Mitigation

If the project will reduce suitable habitat on-site below the threshold level of 6.5 acres per relocated pair or single bird, the habitat should be replaced off-site. Off-site habitat must be suitable burrowing owl habitat, as defined in the *Burrowing Owl Survey Protocol*, and the site approved by CDFG. Land should be purchased and/or placed in a conservation easement in perpetuity and managed to maintain suitable habitat. Off-site mitigation should use one of the following ratios:

1. Replacement of occupied habitat with occupied habitat: 1.5 times 6.5 (9.75) acres per pair or single bird.
2. Replacement of occupied habitat with habitat contiguous to currently occupied habitat: 2 times 6.5 (13.0) acres per pair or single bird.
3. Replacement of occupied habitat with suitable unoccupied habitat: 3 times 6.5 (19.5) acres per pair or single bird.

SECTION 3 LEGAL STATUS

The burrowing owl is a migratory bird species protected by international treaty under the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-711). The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter, any migratory bird listed in 50 C.F.R. Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 C.F.R. 21). Sections 3503, 3503.5, and 3800 of the California Department of Fish and Game Code prohibit the take, possession, or destruction of birds, their nests or eggs. Implementation of the take provisions requires that project-related disturbance at active nesting territories be reduced or eliminated during critical phases of the nesting cycle (March 1 - August 15, annually). Disturbance that causes nest abandonment and/or loss of reproductive effort (e.g., killing or abandonment of eggs or young) or the loss of habitat upon which the birds depend is considered “taking” and is potentially punishable by fines and/or imprisonment. Such taking would also violate federal law protecting migratory birds (e.g., MBTA).

The burrowing owl is a Species of Special Concern to California because of declines of suitable habitat and both localized and statewide population declines. Guidelines for the Implementation of the California Environmental Quality Act (CEQA) provide that a species be considered as endangered or “rare” regardless of appearance on a formal list for the purposes of the CEQA (Guidelines, Section 15380, subsections b and d). The CEQA requires a mandatory findings of significance if impacts to threatened or endangered species are likely to occur (Sections 21001(c), 21083. Guidelines 15380, 15064, 15065). Avoidance or mitigation must be presented to reduce impacts to less than significant levels.

CEQA AND SUBDIVISION MAP ACT

CEQA Guidelines Section 15065 directs that a mandatory finding of significance is required for projects that have the potential to substantially degrade or reduce the habitat of, or restrict the range of a threatened or endangered species. CEQA requires agencies to implement feasible mitigation measures or feasible alternatives identified in EIR’s for projects which will otherwise cause significant adverse impacts (Sections 21002, 21081, 21083; Guidelines, sections 15002, subd. (a)(3), 15021, subd. (a)(2), 15091, subd. (a).).

To be legally adequate, mitigation measures must be capable of “avoiding the impact altogether by not taking a certain action or parts of an action”; “minimizing impacts by limiting the degree or magnitude of the action and its implementation”; “rectifying the impact by repairing, rehabilitating or restoring the impacted environment”; “or reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.” (Guidelines, Section 15.370).

Section 66474 (e) of the Subdivision Map Act states “a legislative body of a city or county shall deny approval of a tentative map or parcel map for which a tentative map was not required, if

it makes any of the following findings:... (e) that the design of the subdivision or the proposed improvements are likely to cause substantial environmental damage or substantially and avoidably injure fish and wildlife or their habitat". In recent court cases, the court upheld that Section 66474(e) provides for environmental impact review separate from and independent of the requirements of CEQA (Topanga Assn. for a Scenic Community v. County of Los Angeles, 263 Cal. Rptr. 214 (1989).). The finding in Section 66174 is in addition to the requirements for the preparation of an EIR or Negative Declaration.

LITERATURE CITED

- Feeney, L. 1992. Site fidelity in burrowing owls. Unpublished paper presented to Raptor Research Annual Meeting, November 1992. Seattle, Washington.
- Haug, E. A. and L. W. Oliphant. 1990. Movements, activity patterns, and habitat use of burrowing owls in Saskatchewan. J. Wildlife Management 54:27-35.
- Henny, C. J. and L. J. Blus. 1981. Artificial burrows provide new insight into burrowing owl nesting biology. Raptor Research 15:82-85.
- Martin, D. J. 1973. Selected aspects of burrowing owl ecology and behavior. Condor 75:446-456.
- Rich, T. 1984. Monitoring burrowing owl populations: Implications of burrow re-use. Wildlife Society Bulletin 12: 178- 180.
- Thomsen, L. 1971. Behavior and ecology of burrowing owls on the Oakland Municipal Airport. Condor 73: 177-192.
- Zam, M. 1974. Burrowing owl. U. S. Department of Interior, Bureau of Land Management. Technical Note T-N 250. Denver, Colorado. 25pp.



U. S. Fish and Wildlife Service

Nevada Fish and Wildlife Office

*Conserving the Biological Diversity of Great Basin, Eastern Sierra
& Mojave Desert*

PROTECTING BURROWING OWLS AT CONSTRUCTION SITES IN NEVADA'S MOJAVE DESERT REGION



Burrowing owl numbers are declining despite protection under the Migratory Bird Treaty Act. Killing or possessing these birds or destruction of their eggs or nest is prohibited.

Be part of the solution; help these owls!



U.S. Fish and Wildlife Service
Nevada Fish and Wildlife Office
4701 N. Torrey Pines Drive
Las Vegas, NV 89130
Phone: 702-515-5230
Fax: 702-515-5231
<http://www.fws.gov/nevada>

Though burrowing owls are capable of digging their own burrows, they often will use burrows of other animals for shelter and nesting. They will even adopt pipes or culverts 6" to 8" in diameter.

Tips for Protecting Burrowing Owls, Their Eggs and Young at Construction Sites:

Even though burrowing owls are often active during the day, always check burrows, cracks, and crevices for owls before beginning construction. Use of a fiber-optic scope or remote mini-camera to look into a burrow can help determine the presence of owls or nests. Ensure owls and eggs are not present in burrows when grading begins, to avoid burying them.

In southern Nevada, owls breed from about mid-March through August. If a burrow has an active nest, the site must be avoided until the chicks have fledged. To ensure that birds will not abandon the nest, a buffer of at least a 250-foot radius should be placed around the burrow, within which no construction should occur. It takes a minimum of 74 days from when eggs are laid until chicks are able to fly (fledge). After the young have fledged, check the nest burrow for any owlets before resuming construction.

The following owl behaviors may help determine breeding or the presence of an active nest:

- **A pair of owls is initially observed at a site, then only one owl is observed.** This may indicate that the pair has chosen a nest burrow, and the female has gone down into the burrow to lay and incubate eggs. Once incubation begins the female rarely leaves the burrow.
- **An owl is frequently observed carrying food to the burrow.** The male provides food for the female while she is incubating eggs. The best time of day to observe owls is dawn and dusk, but they may be active throughout the day. The male will most likely leave the food in front of the burrow and the female will come to the entrance to take

the food. This is probably the best indication that the owls have an active nest.

- **Only one owl has been seen for a period of time; then, two owls are observed.** This may indicate that either the nest has failed, or the eggs have hatched, and the female has emerged from the burrow to assist the male in hunting for food to feed the chicks. The chicks will appear at the burrow entrance when they are about 10 days old.

If you are unsure of breeding status, seek the assistance of a professional biologist or other knowledgeable person. Should breeding behavior be observed, presence of an active nest should be assumed and the area avoided until the chicks have fledged or the nest is no longer occupied.

IMPORTANT! In the Mojave Desert portions of Clark, southern Lincoln and Nye counties, owls may use desert tortoise burrows for nesting and shelter. Desert tortoises are protected under the Endangered Species Act. Killing, harming, or harassing desert tortoises, including destruction of their nests with eggs, without prior authorization is prohibited by Federal law.*

*** IF YOUR PROJECT IS IN CLARK COUNTY, PLEASE READ ON:**

Clark County holds a permit from the U.S. Fish & Wildlife Service authorizing "take" of desert tortoises during the course of otherwise legal activities on non-federal lands. **In Clark County only**, discouraging burrowing owls from breeding in the construction site on private property is allowed by collapsing tortoise burrow's during the owl's non-breeding season (September through February). This may help avoid construction delays. Prior to collapsing a burrow, always check for owls or other protected wildlife occupying the burrow for the winter. Call the Nevada Department of Wildlife at 702-486-5127 if a Gila monster is found as this is a State protected species.

Thank you for your assistance in protecting migratory birds and Nevada's endangered and threatened species!

M e m o r a n d u m

: "Div. Chiefs - IFD, BDD, NED, & WMD
Reg. Mgrs. - Regions 1, 2, 3, 4, & 5

Date : October 17, 1995

From : Department of Fish and Game

Subject :
Staff Report on Burrowing Owl Mitigation

I am hereby transmitting the Staff Report on Burrowing Owl Mitigation for your use in reviewing projects (California Environmental Quality Act [CEQA] and others) which may affect burrowing owl habitat. The Staff Report has been developed during the last several months by the Environmental Services Division (ESD) in cooperation with the Wildlife Management Division (WMD) and regions 1, 2, and 4. It has been sent out for public review and redrafted as appropriate.

Either the mitigation measures in the staff report may be used or project specific measures may be developed. Alternative project specific measures proposed by the Department divisions/regions or by project sponsors will also be considered. However, such mitigation measures must be submitted to ESD for review. The review process will focus on the consistency of the proposed measure with Department, Fish and Game Commission, and legislative policy and with laws regarding raptor species. ESD will coordinate project specific mitigation measure review with WMD.

If you have any questions regarding the report, please contact Mr. Ron Rempel, Supervising Biologist, Environmental Services Division, telephone (916) 654-9980.

COPY Original signed by
C.F. Raysbrook

C. F. Raysbrook
Interim Director

Attachment

cc: Mr. Ron Rempel
Department of Fish and Game
Sacramento

STAFF REPORT ON BURROWING OWL MITIGATION

Introduction

The Legislature and the Fish and Game Commission have developed the policies, standards and regulatory mandates to protect native species of fish and wildlife. In order to determine how the Department of Fish and Game (Department) could judge the adequacy of mitigation measures designed to offset impacts to burrowing owls (*Speotyto cunicularia*; A.O.U. 1991) staff (WMD, ESD, and Regions) has prepared this report. To ensure compliance with legislative and commission policy, mitigation requirements which are consistent with this report should be incorporated into: (1) Department comments to Lead Agencies and project sponsors pursuant to the California Environmental Quality Act (CEQA); and (2) other authorizations the Department gives to project proponents for projects impacting burrowing owls.

This report is designed to provide the Department (including regional offices and divisions), CEQA Lead Agencies and project proponents the context in which the Environmental Services Division (ESD) will review proposed project specific mitigation measures. This report also includes preapproved mitigation measures which have been judged to be consistent with policies, standards and legal mandates of the Legislature, the Fish and Game Commission and the Department's public trust responsibilities. Implementation of mitigation measures consistent with this report are intended to help achieve the conservation of burrowing owls and should compliment multi-species habitat conservation planning efforts currently underway. The *Burrowing Owl Survey Protocol and Mitigation Guidelines* developed by The California Burrowing Owl Consortium (CBOC 1993) were taken into consideration in the preparation of this staff report as were comments from other interested parties.

A range-wide conservation strategy for this species is needed. Any range-wide conservation strategy should establish criteria for avoiding the need to list the species pursuant to either the California or federal Endangered Species Acts through preservation of existing habitat, population expansion into former habitat, recruitment of young into the population, and other specific efforts.

California's burrowing owl population is clearly declining and, if declines continue, the species may qualify for listing. Because of the intense pressure for urban development within suitable burrowing owl nesting and foraging habitat (open, flat and gently rolling grasslands and grass/shrub lands) in California, conflicts between owls and development projects often occur. Owl survival can be adversely affected by disturbance and foraging habitat loss even when impacts to individual birds and nests/burrows are avoided. Adequate information about the presence of owls is often unavailable prior to project approval. Following project approval there is no legal mechanism through which to seek mitigation other than avoidance of occupied burrows or nests. The absence of standardized survey methods often impedes consistent impact assessment.

Burrowing Owl Habitat Description

Burrowing owl habitat can be found in annual and perennial grasslands, deserts, and arid scrublands characterized by low-growing vegetation (Zarn 1974). Suitable owl habitat may also include trees and shrubs if the canopy covers less than 30 percent of the ground surface. Burrows are the essential component of burrowing owl habitat. Both natural and artificial burrows provide protection, shelter, and nests for burrowing owls (Henny and Blus 1981). Burrowing owls typically use burrows made by fossorial mammals, such as ground squirrels or badgers, but also may use man-made structures such as cement culverts; cement, asphalt, or wood debris piles; or openings beneath cement or asphalt pavement.

Occupied Burrowing Owl Habitat

Burrowing owls may use a site for breeding, wintering, foraging, and/or migration stopovers. Occupancy of suitable burrowing owl habitat can be verified at a site by detecting a burrowing owl, its molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance. Burrowing owls exhibit high site fidelity, reusing burrows year after year (Rich 1984, Feeney 1992). A site should be assumed occupied if at least one burrowing owl has been observed occupying a burrow there within the last three years (Rich 1984).

CEQA Project Review

The measures included in this report are intended to provide a decision-making process that should be implemented whenever there is potential for an action or project to adversely affect burrowing owls. For projects subject to the California Environmental Quality Act (CEQA), the process begins by conducting surveys to determine if burrowing owls are foraging or nesting on or adjacent to the project site. If surveys confirm that the site is occupied habitat, mitigation measures to minimize impacts to burrowing owls, their burrows and foraging habitat should be incorporated into the CEQA document as enforceable conditions. The measures in this document are intended to conserve the species by protecting and maintaining viable populations of the species throughout their range in California. This may often result in protecting and managing habitat for the species at sites away from rapidly urbanizing/developing areas. Projects and situations vary and mitigation measures should be adapted to fit specific circumstances.

Projects not subject to CEQA review may have to be handled separately since the legal authority the Department has with respect to burrowing owls in this type of situation is often limited. The burrowing owl is protected from "take" (Section 3503.5 of the Fish and Game Code) but unoccupied habitat is likely to be lost for activities not subject to CEQA.

Legal Status

The burrowing owl is a migratory species protected by international treaty under the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-711). The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 C.F.R. Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 C.F.R. 21). Sections 3505, 3503.5, and 3800 of the California Department of Fish and Game Code prohibit the take, possession, or destruction of birds, their nests or eggs. To avoid violation of the take provisions of these laws generally requires that project-related disturbance at active nesting territories be reduced or eliminated during the nesting cycle (February 1 to August 31). Disturbance that causes nest abandonment and/or loss of reproductive effort (e.g., killing or abandonment of eggs or young) may be considered “take” and is potentially punishable by fines and/or imprisonment.

The burrowing owl is a Species of Special Concern to California because of declines of suitable habitat and both localized and statewide population declines. Guidelines for the Implementation of the California Environmental Quality Act (CEQA) provide that a species be considered as endangered or “rare” regardless of appearance on a formal list for the purposes of the CEQA (Guidelines, Section 15380, subsections b and d). The CEQA requires a mandatory findings of significance if impacts to threatened or endangered species are likely to occur (Sections 21001 (c), 2103; Guidelines 15380, 15064, 15065). To be legally adequate, mitigation measures must be capable of “avoiding the impact altogether by not taking a certain action or parts of an action”; “minimizing impacts by limiting the degree or magnitude of the action and its implementation”; “rectifying the impact by repairing, rehabilitating or restoring the impacted environment”; “or reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action” (Guidelines, Section 15370). Avoidance or mitigation to reduce impacts to less than significant levels must be included in a project or the CEQA lead agency must make and justify findings of overriding considerations.

Impact Assessment

Habitat Assessment

The project site and a 150 meter (approximately 500 ft.) buffer (where possible and appropriate based on habitat) should be surveyed to assess the presence of burrowing owls and their habitat (Thomsen 1971, Martin 1973). If occupied habitat is detected on or adjacent to the site, measures to avoid, minimize, or mitigate the project’s impacts to the species should be incorporated into the project, including burrow preconstruction surveys to ensure avoidance of direct take. It is also recommended that preconstruction surveys be conducted if the species was not detected but is likely to occur on the project site.

Burrowing Owl and Burrow Surveys

Burrowing owl and burrow surveys should be conducted during both the wintering and nesting seasons, unless the species is detected on the first survey. If possible, the winter survey should be conducted between December 1 and January 31 (when wintering owls are most likely to be present) and the nesting season survey should be conducted between April 15 and July 15 (the peak of the breeding season). Surveys conducted from two hours before sunset to one hour after, or from one hour before to two hours after sunrise, are also preferable.

Surveys should be conducted by walking suitable habitat on the entire project site and (where possible) in areas within 150 meters (approx. 500 ft.) of the project impact zone. The 150-meter buffer zone is surveyed to identify burrows and owls outside of the project area which may be impacted by factors -such as noise and vibration (heavy equipment, etc.) during project construction. Pedestrian survey transects should be spaced to allow 100 percent visual coverage of the ground surface. The distance between transect center lines should be no more than 30 meters (approx. 100 ft.) and should be reduced to account for differences in terrain, vegetation density, and ground surface visibility. To effectively survey large projects (100 acres or larger), two or more surveyors should be used to walk adjacent transects. To avoid impacts to owls from surveyors, owls and/or occupied burrows should be avoided by a minimum of 50 meters (approx. 160 ft.) wherever practical. Disturbance to occupied burrows should be avoided during all seasons.

Definition of Impacts

The following should be considered impacts to the species:

- Disturbance within 50 meters (approx. 160 ft.) Which may result in harassment of owls at occupied burrows;
- Destruction of natural and artificial burrows (culverts, concrete slabs and debris piles that provide shelter to burrowing owls); and
- Destruction and/or degradation of foraging habitat adjacent (within 100 m) of an occupied burrow(s).

Written Report

A report for the project should be prepared for the Department and copies should be submitted to the Regional contact and to the Wildlife Management Division Bird and Mammal Conservation Program. The report should include the following information:

- Date and time of visit(s) including name of the qualified biologist conducting surveys, weather and visibility conditions, and survey methodology;
- Description of the site including location, size, topography, vegetation communities, and animals observed during visit(s);
- Assessment of habitat suitability for burrowing owls;
- Map and photographs of the site;
- Results of transect surveys including a map showing the location of all burrow(s) (natural or artificial) and owl(s), including the numbers at each burrow if present and tracks, feathers, pellets, or other items (prey remains, animal scat);
- Behavior of owls during the surveys;
- Summary of both winter and nesting season surveys including any productivity information and a map showing territorial boundaries and home ranges; and
- Any historical information (Natural Diversity Database, Department regional files? Breeding Bird Survey data, American Birds records, Audubon Society, local bird club, other biologists, etc.) regarding the presence of burrowing owls on the site.

Mitigation

The objective of these measures is to avoid and minimize impacts to burrowing owls at a project site and preserve habitat that will support viable owls populations. If burrowing owls are detected using the project area, mitigation measures to minimize and offset the potential impacts should be included as enforceable measures during the CEQA process.

Mitigation actions should be carried out from September 1 to January 31 which is prior to the nesting season (Thomsen 1971, Zam 1974). Since the timing of nesting activity may vary with latitude and climatic conditions, this time frame should be adjusted accordingly. Preconstruction surveys of suitable habitat at the project site(s) and buffer zone(s) should be conducted within the 30 days prior to construction to ensure no additional, burrowing owls have established territories since the initial surveys. If ground disturbing activities are delayed or suspended for more than 30 days after the preconstruction survey, the site should be resurveyed.

Although the mitigation measures may be included as enforceable project conditions in the CEQA process, it may also be desirable to formalize them in a Memorandum of Understanding (MOU) between the Department and the project sponsor. An MOU is needed when lands (fee title or conservation easement) are being transferred to the Department.

Specific Mitigation Measures

1. Occupied burrows should not be disturbed during the nesting season (February 1 through August 31) unless a qualified biologist approved by the Department verifies through non-invasive methods that either: (1) the birds have not begun egg-laying and incubation; or (2) that juveniles from the occupied burrows are foraging independently and are capable of independent survival.
2. To offset the loss of foraging and burrow habitat on the project site, a minimum of 6.5 acres of foraging habitat (calculated on a 100 m {approx. 300 ft.} foraging radius around the burrow) per pair or unpaired resident bird, should be acquired and permanently protected. The protected lands should be adjacent to occupied burrowing owl habitat and at a location acceptable to the Department. *Protection of additional habitat acreage per pair or unpaired resident bird may be applicable in some instances.* The CBOC has also developed mitigation guidelines (CBOC 1993) that can be incorporated by CEQA lead agencies and which are consistent with this staff report.
3. When destruction of occupied burrows is unavoidable, existing unsuitable burrows should be enhanced (enlarged or cleared of debris) or new burrows created (by installing artificial burrows) at a ratio of 2:1 on the protected lands site. One example of an artificial burrow design is provided in Attachment A.
4. If owls must be moved away from the disturbance area, passive relocation techniques (as described below) should be used rather than trapping. At least one or more weeks will be necessary to accomplish this and allow the owls to acclimate to alternate burrows.
5. The project sponsor should provide funding for long-term management and monitoring of the protected lands. The monitoring plan should include success criteria, remedial measures, and an annual report to the Department.

Impact Avoidance

If avoidance is the preferred method of dealing with potential project impacts, then no disturbance should occur within 50 meters (approx. 160 ft.) of occupied burrows during the nonbreeding season of September 1 through January 31 or within 75 meters (approx. 250 ft.) during the breeding season of February 1 through August 31. Avoidance also requires that a minimum of 6.5 acres of foraging habitat be *permanently* preserved contiguous with occupied burrow sites for each pair of breeding burrowing owls (with or without dependent young) or single unpaired resident bird. The configuration of the protected habitat should be approved by the Department.

Passive Relocation - With One-Way Doors

Owls should be excluded from burrows in the immediate impact zone and within a 50 meter (approx. 160 ft.) buffer zone by installing one-way doors in burrow entrances. One-way doors (e.g., modified dryer vents) should be left in place 48 hours to insure owls have left the burrow before excavation. Two natural or artificial burrows should be provided for each burrow in the project area that will be rendered biologically unsuitable. The project area should be *monitored daily for one* week to confirm owl use of burrows before excavating burrows in the immediate impact zone. Whenever possible, burrows should be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe should be inserted into the tunnels during excavation to maintain an escape route for any animals inside the burrow.

Passive Relocation - Without One-Way Doors

Two natural or artificial burrows should be provided for each burrow in the project area that will be rendered biologically unsuitable. The project area should be *monitored daily until the owls have relocated to the new burrows*. The formerly occupied burrows may then be excavated. Whenever possible, burrows should be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe should be inserted into burrows during excavation to maintain an escape route for any animals inside the burrow.

Projects Not Subject to CEQA

The Department is often contacted regarding the presence of burrowing owls on construction sites, parking lots and other areas for which there is no CEQA action or for which the CEQA process has been completed. In these situations, the Department should seek to reach agreement with the project sponsor to implement the specific mitigation measures described above. If they are unwilling to do so, passive relocation without the aid of one-way doors is their only option based upon Fish and Game Code 3503.5.

Literature Cited

- American Ornithologists Union (AOU). 1991. Thirty-eighth supplement to the AOU checklist of North American birds. *Auk* 108:750-754.
- Feeney, L. 1992. Site fidelity in burrowing owls. Unpublished paper presented to Raptor Research Annual Meeting, November 1992. Seattle, Washington.
- Haug, E. A. and L. W. Oliphant. 1990. Movements, activity patterns, and habitat use of burrowing owls in Saskatchewan. *J. Wildlife Management* 54:27-35.
- Henny, C. J. and L. J. Blus. 1981. Artificial burrows provide new insight into burrowing owl nesting biology. *Raptor Research* 15:82-85.
- Martin, D. J. 1973. Selected aspects of burrowing owl ecology and behavior. *Condor* 75:446-456.
- Rich, T. 1984. Monitoring burrowing owl populations: Implications of burrow re-use. *Wildlife Society Bulletin* 12:178-180.
- The California Burrowing Owl Consortium (CBOC). 1993. Burrowing owl survey protocol and mitigation guidelines. Tech. Rep. Burrowing Owl Consortium, Alviso, California.
- Thomsen, L. 1971. Behavior and ecology of burrowing owls on the Oakland Municipal Airport. *Condor* 73:177-192.
- Zarn, M. 1974. Burrowing owl. U. S. Department of Interior, Bureau of Land Management. Technical Note T-N 250. Denver, Colorado. 25 pp.

Reproductive Success of Burrowing Owls Using Artificial Nest Burrows in Southeastern Idaho

by Bruce Olenick

Artificial nest burrows were implanted in southeastern Idaho for burrowing owls in the spring of 1986. These artificial burrows consisted of a 12" x 12" x 8" wood nesting chamber with removable top and a 6 foot corrugated and perforated plastic drainage pipe 6 inches in diameter (Fig. 1). Earlier investigators claimed that artificial burrows must provide a natural dirt floor to allow burrowing owls to modify the nesting tunnel and chamber. Contrary to this, the artificial burrow introduced here does not allow owls to modify the entrance or tunnel. The inability to change the physical dimensions of the burrow tunnel does not seem to reflect the owls' breeding success or deter them from using this burrow design.

In 1936, 22 artificial burrows were inhabited. Thirteen nesting attempts yielded an average clutch size of 8.3 eggs per breeding pair. Eight nests successfully hatched at least 1 nestling. In these nests, 67 of 75 eggs hatched (59.3%) and an estimated 61 nestlings (91.0%) fledged. An analysis of the egg laying and incubation periods showed that incubation commenced well after egg lay-

ing began. Average clutch size at the start of incubation was 5.6 eggs. Most eggs tended to hatch synchronously in all successful nests.

Although the initial cost of constructing this burrow design may be slightly higher than a burrow consisting entirely of wood, the plastic pipe burrow offers the following advantages: (1) it lasts several field seasons without rotting or collapsing; (2) it may prevent or retard predation; (3) construction time is min-

imal; (4) it is easy to transport, especially over long distances; and (5) the flexible tunnel simplifies installation. The use of this artificial nest burrow design was highly successful and may prove to be a great resource technique for future management of this species.

For additional information on constructing this artificial nest burrow, contact Bruce Olenick, Department of Biology, Idaho State University, Pocatello, ID 83209.

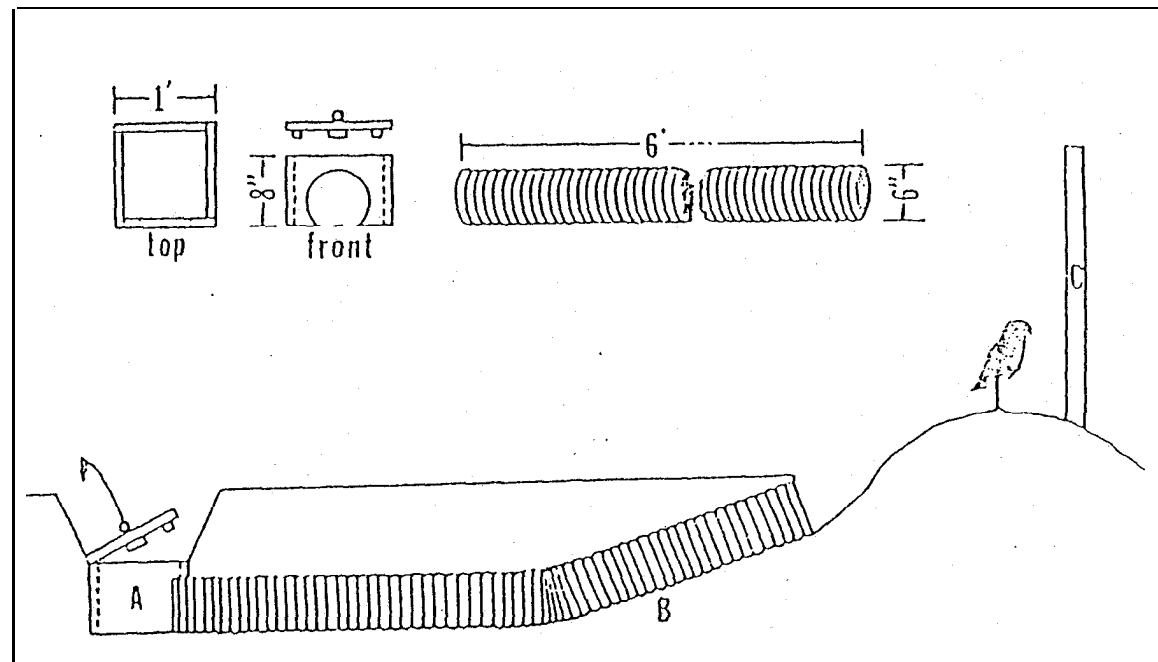


fig. 1 Artificial nest burrow design for burrowing owls Entire unit (including nest chamber) is buried 12" -- 18" below ground for maintaining thermal stability of the nest chamber. A= nest chamber, B = plastic pipe. C = perch.

Preparing Raven Monitoring and Control Plans (Draft)

Effective control of common ravens reduces adverse impacts on desert tortoises.

Effective controls include reducing potential raven attractants, such as:

- Available water from dust abatement activities, equipment cleaning and maintenance, evaporation and retention ponds, drainage areas or landscaping;
- Potential perching, roosting, or nesting sites (such as power lines and structures);
- Food sources from soil disturbance and road kill (e.g., small mammals, insects);
- Food sources and attractants from human and animal food and waste.

Describe in raven monitoring and control plans methods to avoid attracting common ravens during all phases of development and use, including construction, operation, and decommissioning. In situations where raven attractants cannot be eliminated, include in a plan's best management practices (BMPs). To address the indirect and cumulative effects of the project, participation in a regional raven management plan either through monetary or in-kind contributions may be recommended by the permitting agencies.

Incorporate the most recent guidance from the U.S. Fish and Wildlife Service and include the following elements in a draft raven monitoring and control plan:

- a. Purpose/objectives of the plan;
- b. Identification of project design features and other measures to manage potential introduction of raven attractants to the area;
- c. Identification of the area covered by the monitoring and raven control activities;
- d. Description of baseline data documenting the abundance of ravens on the project site and out to one mile from the project boundaries;
- e. Establishment of quantitative success criteria for achieving the plan objectives;
- f. Documentation of project design feature effectiveness and BMPs such as reduction of available attractants, raven monitoring, eliminating problem ravens, raven nest removal and assurances for carrying out the BMPs during the life of the project;
- g. Identification of triggers that will prompt implementation of BMPs, and a description of the BMPs;
- h. Description of a monitoring plan, including a discussion of survey methods and frequency for establishing baseline data on pre-project raven numbers and activities, and assessing post-project changes from this baseline;
- i. Description of adaptive management practices used to ensure effectiveness of accomplishing the purpose of the raven management plan;
- j. Regular reporting to document raven management measures that have been implemented and results of raven abundance and effectiveness monitoring throughout the life of the project; and
- k. Describe worker education, during all phases of development, for avoiding and reducing raven attractants and promoting desert tortoise awareness.

Preparing Revegetation Plans for Addressing Impacts to Vegetated State Waters

If revegetation mitigation is proposed for vegetated ephemeral drainages impacts, prepare a revegetation plan that includes, at a minimum, the following elements¹:

- a. Overall Goal: Explicitly state the revegetation plan overarching goal. Include, at a minimum, a goal for replicating the hydrological and biological functions and values of the impacted desert washes.
- b. Existing Functions and Values. Describe the existing drainages' functions and values that are to be replaced by the engineered channels. Include a discussion of the characteristic soils (biological soil crust, permeability), sediment transport and other geomorphic processes, microtopography (microcatchments for moisture, seeds), vegetation (zonation, composition, cover density, dominants in each stratum, rare or uncommon species or communities, non-native component), and wildlife habitat and values (connectivity and corridors, rare species, habitat elements).
- c. Reference Reach. Select one or several reference reach(es) along existing channels that would provide a mitigation design and success criteria target. Provide photos, a hard-copy and GIS [shape files & metadata] map of the reference reach(es). Provide detailed reference reach descriptions and how the features of the reach(es) relate to the mitigation goals and success criteria (see d. and e. below). Include a rationale for selection for the reference reach(es).
- d. Proposed Mitigation Design. Describe the revegetation plan mitigation goals and target functions/values (hydrologic, geomorphic, water quality, habitat function/value) and a rationale for these goals and targets. Include a discussion of compensation ratios (indicating the acreage ratio(s) of impacted vegetated wash to the recreated acreage), and long-term goal(s) for habitat to be created at the site 10, 20, and 30 years following implementation.
- e. Success Criteria. Provide a success criteria and quantitative parameters table to measure successful achievement of the criteria. The criteria should address each major aspect of the project, including replication of natural hydrological and geomorphological processes and establishment of appropriate vegetation and wildlife habitat values.
- f. Monitoring Methods. Describe proposed methodology for measuring progress toward meeting success criteria and the rationale for selecting the methodology. Describe sampling methods used and include size of sample units and number of samples.
- g. Monitoring Schedule. Monitoring should be tied to the appropriate spring growing season, with the "first year" of monitoring occurring one full growing season following completion of facility installation. Given the slow pace of revegetation in desert ecosystems, a 10 year monitoring period is appropriate. In addition to

¹ Refer to the California Department of Conservation's *Rehabilitation of Disturbed Lands in California: A Manual for Decision-Making* (Newton & Claasen 2003) @ <http://www.consrv.ca.gov/omr/reclamation/Pages/index.aspx> for additional guidance on development of a revegetation plan.

quantitative methods, ground and/or aerial photos can be used to illustrate overall year-to-year revegetation progress.

- h. Implementation Plan. Describe revegetation equipment, procedures, access paths, and any measures for avoiding sensitive areas outside the grading plan boundaries. Of particular importance is topsoil storage and disposition. The implementation plan should include a description of how the top layer (top 1 inch) of soil will be salvaged from the existing washes, stockpiled and maintained to sustain viability, and how these soils will be applied during revegetation efforts. Indicate storage location of topsoil, area required for storage, duration of intended storage, and ultimate disposition of topsoil material in the engineered channels. Discuss how revegetation of channel bottom areas would integrate with channel slope protection and erosion control and any opportunities for bioengineering.
- i. Weed Control. Describe method(s) for removing noxious plants from the mitigation site during the course of revegetation and monitoring, and specific triggers for when weed control is required.
- j. Planting/Seeding. Provide a table of species to be planted and indicate geographic source of plants (of local origin), type of propagules to be used, and season in which seeding/planting/transplanting is to be done. Include size and quantity of propagules and/or intended spacing. For transplant propagules, describe method, harvest site location, and duration of storage, if applicable.
- k. Irrigation. Revegetation projects should be hydrologically self-sustaining. Irrigation may be needed in the early years of a project to establish new vegetation. If irrigation is proposed, describe recommended irrigation methods, including estimated frequency, and indicate month(s) in which it is to occur. Also indicate irrigation water source(s).
- l. Implementation Schedule. Provide a schedule showing intended timing (by month) for site preparation, any seed/topsoil storage, seed/topsoil application, and plantings.
- m. Maintenance and Monitoring. Describe planned maintenance activities (e.g. inspection of irrigation system, inspection of water structure(s), erosion control, weeding, etc.). Identify any pest species (plant and/or animal) that might cause problems on the site, and provide a species control plan, if appropriate. Indicate the critical threshold of disturbance that will trigger use of control methods. Provide a table showing a proposed maintenance inspection frequency schedule over the life of the project.
- n. Monitoring Reports. Monitoring reports to the appropriate lead agencies will likely be due January 31st of each year. Describe the overall content and purpose of the annual reports.
- o. Contingency Measures. If an annual performance goal is not met for all or any portion of the mitigation project in any year, or if the final success criteria are not met, describe how the failure will be remedied. Include a process for analysis of the cause(s) of failure and propose remedial action for appropriate agency approval. Remedial actions could include replanting, weed or herbivore control. Provide a funding mechanism to pay for planning, implementation, and monitoring of any contingency procedures that may be required and present all

necessary assurances that the funds will remain available until success criteria have been achieved.

- p. Long-Term Management. Integrate long-term management (weed/vegetation management, preventing wildlife entrapment hazards) with any channel maintenance programs so that when revegetation success criteria are fulfilled the responsibility for channel and vegetation maintenance will be transferred to a maintenance entity.

Preparing Special-Status Plant Avoidance/Mitigation Plans

Provide detailed specifications for avoiding/minimizing construction and operations impacts to preserved plants within 250 feet of project linear facilities and site boundaries. These specifications might include: designating Environmentally Sensitive Areas during construction; management guidelines to prevent the spread of noxious weeds; protecting preserved plants from herbicide or soil-stabilizer drift, construction and operation dust, sedimentation, fire, and alteration of the site hydrology; and ensuring permanence through fencing where necessary to protect from accidental harm. Permitting agencies may recommend that remaining impacts be described and quantified and that the following opportunities for off-site mitigation be investigated in the listed order of priority:

- a. Off-site Compensation through Restoration. Provide an assessment of restoring degraded special-status plant populations on- or off-site (for example, by controlling unauthorized vehicle use, noxious weed management).
- b. Off-site Compensation through Acquisition/Protection. Provide a feasibility assessment addressing compensation for unavoidable impacts to special-status plants through off-site acquisition and protection of special-status plant populations and watershed lands important to the ecological health of the populations. To provide adequate compensatory mitigation the ratio of acquisition to loss would likely need to exceed 1:1 and would also need to include deed restrictions and a management plan to ensure the long-term viability of the plant population(s).
- c. Off-site Compensation through Transplanting or Propagating and Planting. These measures are choices of last resort if mitigation methods listed in a. and b. above are infeasible or are insufficient to reduce impacts to less-than-significant levels. Transplanting or using replacement plantings are untested and generally unsuccessful measures, and thus cannot be used as substitutes for avoiding and minimizing project impacts. Considerable advance planning is typically required for transplantation or replacement plantings; a minimum 9-12 months lead time is often needed before the start of construction for seed collection/salvage. If there is evidence that transplantation or replacement plantings might be successful, please provide a detailed transplantation or replacement planting plan.

Preparing Weed Management Plans

Include, at a minimum, the following elements in weed management plans:

- a. Plan Goals and Objectives. Define the weed management plan goals. At a minimum, weed management plans should endeavor to protect the biological resources surrounding the project from the harmful effects of weeds and potential unintended harm from weed management techniques, and will be consistent with all applicable agency requirements. Identify specific weed management objectives (eradication, suppression, or containment) for each non-native plant species that could potentially threaten the areas affected by the project.
- b. Noxious Weed Inventory/Baseline Conditions. Describe the baseline conditions (species identified onsite, vectors, population densities, etc.) and provide a map showing concentrations of the noxious weeds and other non-native plants described in applications to lead agencies, as well as all project features, areas where soil disturbance will occur, and roads used by the project during construction, operation, and closure. For weeds too widespread to map, depict their approximate distribution and include specifications for a detailed baseline mapping at a future date as part of the plan implementation.
- c. Define and Map the Weed Management Area. Identify the areas that will be included as part of the weed management area (WMA). Include in WMAs project facilities, linear facilities and a buffer area 100 feet out from the boundary of these features, and access roads and a buffer 25 feet out from both sides of the roads. Include a GIS-based map of the project area and clearly define the buffer zone and facility areas..
- d. Weed Risk Assessment. Conduct a weed risk assessment for each component of project construction, operation, and closure that involves soil disturbing activities or altering vegetation. An example of a stepwise risk assessment is available online at: <http://www.blm.gov/ca/st/en/prog/weeds/9015.html>.
- e. Monitoring and Survey Methods. Describe survey and monitoring methods that will be used during construction and operation to ensure timely detection and prompt eradication of weed infestations. Describe how locations of noxious weed occurrences and other data (detection date, growth stage, infestation extent, treatments implemented, results of treatment, and current status) will be mapped and maintained during the construction and operation phases.
- f. Weed Management. Describe measures that will be employed during construction, operations, and site closure to prevent the establishment of new weed species, eliminate small, rapidly-growing infestations, prevent large infestations from expanding, and reduce or eliminate large infestations. Include implementation schedules, monitoring reporting requirements, budgets, and responsible parties. Include the following elements: Prevention & Exclusion; Early Detection & Rapid Response; Eradication & Management; Restoration (of treated sites); Employee Education & Training; Funding & Resources; Enforcement & Compliance. Refer, for example, to the Bureau of Land Management's Weed Prevention and Management Guidelines online: <http://www.blm.gov/ca/st/en/prog/weeds/weedprevent.html>

- g. Reporting Requirements. Describe the proposed content of construction-phase monitoring reports and long-term weed control progress reports. Reporting during construction may include weekly summary reports describing observations and activities relevant to noxious weeds management, and a compilation and analysis of this information into quarterly reports. Upon completion of construction prepare a report describing the overall results of noxious weed management and current weed status at the project site. Thereafter produce annual monitoring reports for the duration of the monitoring period. Include in annual reports information on noxious weed surveys and management activities for the year, a discussion of whether the weed management goals for the year were met, and recommendations for weed management activities in the upcoming year.
- h. Attachments/Other Information. If the following elements were not included in the body of the report they could be included as attachments to the weed management plan: detailed maps (see c., above); herbicide use protocols and sample record forms; sample monitoring data forms; California Invasive Plant Council and Department of Fish and Game rankings and ratings and details on management strategy and control methods for each observed and potentially occurring noxious weed on the project site; species -specific goals and objectives (measurable, with time frame); and methods for evaluation of success in achieving weed control goals.

Protecting California Desert Region Bighorn Sheep

The term "desert bighorn sheep" refers to a collection of bighorn sheep subspecies that inhabit the mountainous, desert regions of the American Southwest, Baja Peninsula and mainland Mexico. The three desert subspecies are *Ovis canadensis nelsoni*, *Ovis canadensis mexicana*, and *Ovis canadensis weemsi*. The listed entity, Peninsular bighorn sheep, were formerly considered a separate subspecies known as *O.c. cremnobates*. However, modern genetic techniques resulted in a taxonomic revision that assigns Peninsular bighorn to *O.c. nelsoni*. Peninsular bighorn sheep live in the Peninsular Mountain Ranges, which extend from Palm Springs down the Baja peninsula. Bighorn sheep in the Mojave do not live in the Peninsular ranges, so they are generally referred to as "desert" or "Mojave" bighorn sheep, but they are the same subspecies as the Peninsular bighorn sheep. This guidance is applicable to the *O.c. nelsoni* subspecies (Peninsular bighorn and desert bighorn in the Mojave Desert), and can facilitate protection of desert habitats that are utilized by sheep as well as other wildlife species in the California desert region.

Peninsular bighorn sheep (*O.c. nelsoni*) are listed as an endangered distinct population segment under the federal Endangered Species Act (ESA) and as a distinct vertebrate population segment under the California Endangered Species Act (CESA). A distinct population segment is geographically and reproductively isolated from the remainder of the conspecific population units. Peninsular bighorn sheep can no longer cross the Interstate(s), cities, and agricultural land to reach other bighorn sheep, yet they are a significant group of bighorn, worth saving - thus the listings under the ESA and CESA. Mojave bighorn are considered a sensitive species by the U.S. Bureau of Land Management.

The California Department of Fish and Game (CDFG) uses the metapopulation concept to manage bighorn sheep in the California desert. A metapopulation is a group of subpopulations that are connected, meaning that there are individuals that move from one subpopulation to another. This interchange of individuals prevents the subpopulations from being completely isolated. Small isolated groups of animals have a greater likelihood of going extinct due to genetic or environmental problems. Therefore, the periodic movement of individuals between subpopulations helps prevent extinctions. Bighorn sheep rams, generally, move between subpopulations each year during the rut (breeding season). However, ewes do move between subpopulations, just not as often as the rams. In the California desert, bighorn sheep exist in natural metapopulations, because they are tied to the mountains, but travel across the valleys, alluvial fans, and bajadas when moving from one subpopulation to another. Therefore, it is very important to preserve these travel routes otherwise the dynamic of the metapopulation will be destroyed. CDFG and the U.S. Fish and Wildlife Service (USFWS) consider the Peninsular bighorn sheep to be a metapopulation of approximately 9+ subpopulations and usually call the subpopulations "ewe groups". Mojave bighorn sheep are regarded as a separate metapopulation and CDFG has been working on a management plan that identifies the important travel routes used by bighorn to cross between the mountain ranges.

The following guidance is offered to supplement consultation with CDFG and USFWS, to plan projects from the start and provide protection for listed and unlisted bighorn sheep populations that will likely be affected by energy development.

1. Avoid construction during the lambing season, which extends from January 1 through June 30, when energy development facilities are proposed to be sited within one-half mile of bighorn sheep lambing areas.
2. Minimize construction of access roads and gate effectively to prevent unauthorized vehicle entry.
3. Ensure that helicopters used for construction, or other purposes requiring multiple trips, adhere to predetermined flight paths and landing zones that minimize disturbance to bighorn sheep.
4. Avoid siting wind and solar energy projects on ridgecrests that overtop bighorn sheep habitat, especially in lambing areas and escape terrain (rugged, rocky areas).
5. Identify and preserve travel routes between subpopulations and mountain ranges when siting energy development projects.
6. Identify bighorn sheep water sources which could be adversely affected by energy project related groundwater pumping or other project characteristics. Develop measures to ensure bighorn sheep have adequate water sources in perpetuity.

Swainson's Hawk
Survey Protocols, Impact Avoidance, and Minimization Measures
for Renewable Energy Projects in the Antelope Valley of Los Angeles and Kern
Counties, California

State of California
California Energy Commission and Department of Fish and Game
June 2, 2010

Swainson's Hawk Background Information

The Swainson's hawk (*Buteo swainsoni*) is listed as a California state threatened species under the California Endangered Species Act (CESA). The species is not listed as threatened or endangered under the federal Endangered Species Act. To comply with state wildlife protection requirements and receive project approvals, renewable energy project developers proposing projects in the Desert Renewable Energy Conservation Plan (DRECP) area may be required to conduct surveys and avoid or minimize impacts to Swainson's hawks and related nesting and foraging habitat. The survey protocols and mitigation and monitoring plan recommendations provided below suggest approaches and measures for complying with protection requirements.

Antelope Valley Swainson's hawks are known to have historically nested in Joshua tree woodlands and foraged in grasslands and native desert scrub communities. Currently, they nest in Joshua tree woodlands, ornamental roadside trees, and windrow or perimeter trees in active and historical agricultural areas. Foraging habitat includes dry land and irrigated pasture, alfalfa, fallow fields, low-growing row or field crops, new orchards, and cereal grain crops. Swainson's hawks may also forage in grasslands, Joshua tree woodlands, and other desert scrub habitats that support a suitable prey base. Gophers dominate the prey base of agriculturally based pairs while Swainson's hawks nesting in natural desert habitats consume a wider variety of prey species. While California's Central Valley Swainson's hawk population winters in Mexico, Central America South America, and a small percentage in the Central Valley, the migration habits of the Antelope Valley population are unknown. Recent observations suggest that they may arrive in nesting territories generally later than the Central Valley Population (Pete Bloom, raptor biologist, personal communication).

Environmental Review Considerations

The California Environmental Quality Act (CEQA), Warren-Alquist Act and implementing regulations, and CESA require consideration of direct, indirect, temporary, permanent, individual project, and cumulative impacts. CEQA allows approval of projects with significant effects when measures have been included to avoid or mitigate those effects, or specific considerations make such measures infeasible and specific benefits outweigh the significant effects. (CEQA Guidelines §21081). CESA regulates the

taking of state-listed species. “Take” is defined as to “hunt, pursue, catch, capture, or kill, or to attempt to hunt, pursue, catch, capture, or kill.” (Fish and Game Code §86). Incidental take authorization requires that all impacts to the species are minimized and fully mitigated and that mitigation is roughly proportional to the extent of the impacts of the taking. (14CCR § 783.4). This “full mitigation” standard is intended to ensure that the status of the species is the same or better after project and mitigation implementation as it was prior to project implementation.

Renewable energy project development could cause direct, indirect, individual, and cumulative adverse impacts to Swainson’s hawks when facility construction and operation areas (such as wind turbines, power plants, solar panels and tower sites, access roads, staging areas, and pulling/splicing locations) occur in areas where hawks are present. Potential impacts include loss of foraging habitat and disruption of breeding activities due to increased dust, noise, and human presence. Direct mortality from vehicle strikes and collisions with wind turbines is also known to occur. Construction disturbance during the breeding season and habitat loss could cause incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment.

The current land uses in the Antelope Valley area support approximately 10 breeding pairs. This area comprises the southernmost edge of the known breeding range for this species in California. The small number of breeding Swainson’s hawks in the Antelope Valley and the potential isolation from other Swainson’s hawk populations makes the Antelope Valley population particularly susceptible to extirpation. Swainson’s hawks have high nest site fidelity, meaning they return to the same site year after year (Estep 1989, Woodbridge et al. 1995). This may limit exchange of individual birds between distant breeding groups (Hull et al. 2007). Hull et al. (2007) found evidence suggesting that the Central Valley population has had little recent genetic exchange with other populations east of the Sierra Nevada. Due to the geographical isolation of the Antelope Valley Swainson’s hawk population from other breeding populations, together with the species’ high site fidelity, it is reasonable to infer that rapid re-colonization of the Antelope Valley would be unlikely if nesting pairs were lost. Given these facts, the California Department of Fish and Game (Department) would consider impacts to breeding pairs to be potentially significant because they may cause the population to become less than self-sustaining.

A substantial reduction in numbers or habitat of a rare, threatened, or endangered species would be considered a significant impact under CEQA. Potentially significant impacts may result from activities that cause nest abandonment, loss of nest trees, loss of foraging habitat that would reduce nesting success (loss or reduced health or vigor of eggs or young), or direct mortality. Due to the Swainson’s hawk’s known preference for areas of low vegetation that support abundant prey, such as grasslands or alfalfa fields (Bechard 1982, Babcock 1995), the Department considers conversion of foraging areas to renewable energy power plant facility sites to be habitat loss. For example, solar panel arrays are expected to eliminate most or all foraging potential. Significant habitat loss may result from individual projects and cumulatively, from multiple projects. Each

project which contributes to a significant cumulative effect must offset its contribution to that effect in order to determine that the cumulative impacts have been avoided.

The Department considers a nest site to be active if it was used at least once during the past 5 years. Impacts to suitable habitat or individual birds within a five-mile radius of an active nest will be considered significant and to have the potential to “take” Swainson’s hawks as that term is defined in §86 of the Fish and Game Code. Please consult with the Department when determining whether “take” authorization is warranted for a specific project.

Special Considerations for Wind Energy Development

Wind turbines present an additional, continuous, long-term risk of Swainson’s hawk take throughout the life of a project. This continuous risk is not always considered in the environmental analyses for other types of projects that may have limited short-term impacts (e.g. construction related impacts). It has been documented elsewhere in California that Swainson’s hawks are killed by wind turbines. Turbine strikes could occur during migration or during the nesting season. Swainson’s hawk surveys for wind energy development should follow the same methods as for solar energy projects, described below, but the impacts analysis and corresponding mitigation should consider the additional continuous long-term risk of turbine-related fatalities. Habitat impact analysis should consider both the ground surface area and the air space that is used by Swainson’s hawks. The mitigation methods described below are specific to ground surface impacts. Wind energy development project proponents should consult with the Department to develop avoidance measures and mitigation specific for the loss of air space and the potential for on-going take of Swainson’s hawk during project operations.” For additional avian considerations that are applicable to Swainson’s hawk, please refer to the “California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development” (California Energy Commission and California Department of Fish and Game 2007). The guidelines can be found at <http://www.energy.ca.gov/windguidelines/index.html>.

Survey Protocol

The following survey protocols and monitoring/mitigation recommendations suggest surveys and acquisition of mitigation lands prior to construction of the project if nests are found within five miles of a project site. Before conducting surveys for a particular project, project developers are encouraged to contact the Department and the appropriate lead agencies for up-to-date, site-specific issues and possible refinement of the following survey protocols and monitoring/mitigation recommendations. Survey methods may be flexible depending on surveyor experience and/or already-known nesting status for a given site. Please contact the Department (Region 4 for Kern County and Region 5 for Los Angeles County) to use an alternate survey plan from that suggested within this document.

A qualified raptor biologist with Swainson's hawk survey experience, approved by the Department and the appropriate lead agency, should conduct surveys in a manner that maximizes the potential to observe the adult Swainson's hawks and the nest/chicks via visual and audible cues within a five-mile radius of the project. All potential nest trees within the five-mile radius shall be surveyed for presence of nests. Surveys should be conducted prior to environmental analysis. Surveys should be repeated within the 5-mile radius if a survey season ensues or elapses before the onset of project related activities. If construction begins mid-survey season the year after the initial surveys, then the surveys should continue for that part of the season before construction.

Examples of suitable habitats are Joshua tree woodlands, grasslands, desert scrub communities, and agricultural lands (such as alfalfa, fallow fields, beet, tomato, onions, and other low-growing row or field crops, dry-land and irrigated pasture, cereal grain crops [including corn after harvest], and new orchards). Consult with the Department when determining whether the project site is within five miles of already-known nest sites. If hawks or known nest sites are found within the five-mile radius, consult with the Department and the appropriate lead agency for follow-up to the surveys.

Minimum Equipment

Minimum survey equipment includes a high-quality pair of binoculars and a high quality spotting scope. Surveying even the smallest project area will take hours, and poor optics often result in eye-strain and difficulty distinguishing details in vegetation and subject birds. Other equipment includes good maps, GPS units, flagging, and notebooks.

Walking vs Driving

Driving or "windshield surveys" are usually preferred to walking if an adequate roadway is available through or around the project site. While driving, the observer can typically make a closer approach to a hawk without causing the bird to fly. Although it might appear that a flying bird is more visible, they often fly away from the observer using trees as screens; and it is difficult to determine from where a flying bird originated. Walking surveys are useful in locating a nest after a nest territory is identified, or when driving is not an option.

Angle and Distance to the Tree

Surveying subject trees from multiple angles will greatly increase the observer's chance of detecting a nest or hawk, especially after trees are fully leafed and when surveying multiple trees in close proximity. When surveying from an access road, survey in both directions. Maintaining a distance of 50 meters to 200 meters from subject trees is optimal for observing perched and flying hawks without greatly reducing the chance of detecting a nest/young. Once a nesting territory is identified, a closer inspection may be required to locate the nest.

Speed

Travel at a speed that allows for a thorough inspection of a potential nest site. Survey speeds should not exceed 5 miles per hour to the greatest extent possible. Stop frequently to scan subject trees with binoculars and a spotting scope.

Visual and Audible Cues

Focus surveys on both observations and vocalizations. Observations of nests, perched adults, displaying adults, and chicks during the nesting season are all indicators of nesting Swainson's hawks. In addition, vocalizations are extremely helpful in locating nesting territories. Vocal communication between hawks is frequent (1) during territorial displays, (2) during courtship and mating, (3) through the nesting period as mates notify each other that food is available or that a threat exists, (4) and as older chicks and fledglings beg for food.

Distractions

Minimize distractions while surveying. Although two pairs of eyes may be better than one pair at times, conversation may limit focus. Radios should be off, not only are they distracting, they may cover a hawk's call.

Notes and Species Observed

Take thorough field notes. Detailed notes and maps of the location of observed Swainson's hawk nests are essential for filling gaps in the California Natural Diversity Data Base; please note all observed nest sites, including date and time of observation, location name, UTM coordinates, number of young, and any behavioral observations. Also document the occurrence of nesting great horned owls, red-tailed hawks, red-shouldered hawks and other potentially competitive species. These species will infrequently nest within 100 yards of each other, so the presence of one species will not necessarily exclude another.

Timing

To meet *the minimum level* of protection for the species, surveys should be completed for *at least* the two survey periods immediately prior to a project's initiation. For example, if a project is scheduled to begin on June 1, you should complete three surveys in Period II and three surveys in Period III. However, it is always recommended that surveys be completed in Periods II, III, and IV prior to environmental review.

Survey Period I

Survey dates: January-March 31 (optional but recommended; pre-arrival)

Survey Time: All day

Number of Surveys: 1

Justification and search image: Prior to Swainson's hawks arrival from wintering grounds, it is very helpful to survey the project area to determine potential nest locations. Most nests are easily observed from relatively long distances, giving the surveyor the opportunity to identify potential nest sites, as well as becoming familiar with the project area. It also gives the surveyor the opportunity to locate and map competing species nest sites such as great horned owls from February on, and red-tailed hawks

from March on. After March 1, surveyors may observe Swainson's hawks staging in traditional nest territories.

Survey Period II

Survey dates: April 1 – April 30 (arrival; nest building)

Survey Time: All day

Number of Surveys: 3

Justification and search image: Most Antelope Valley Swainson's hawks return by April 1, and immediately begin occupying their traditional nest territories. For those few that do not return by April 1, there are often hawks ("floaters") that act as place-holders in traditional nest sites; they are birds that do not have mates, but temporarily attach themselves to traditional territories and/or one of the site's "owners." Floaters are usually displaced by the territories' owner(s) if the owner returns. Most trees are leafless and are relatively transparent; it is easy to observe old nests, staging birds, and competing species. The hawks are usually in their territories during the survey hours, but typically soaring and foraging in the mid-day hours. Swainson's hawks may often be observed involved in territorial and courtship displays, and circling the nest territory. Potential nest sites identified by the observation of staging Swainson's hawks will usually be active territories during that season, although the pair may not successfully nest/reproduce that year. Both males and females are actively nest building, visiting their selected site frequently. Later in this survey period, territorial and courtship displays are increased, as is copulation. The birds tend to vocalize often, and nest locations are most easily identified. This period may require a great deal of "sit and watch" surveying.

Survey Period III

Survey dates: May 1 – May 30 (egg laying; incubation)

Survey Time: daylight hours, as needed to monitor known nest sites only

Number of Surveys: 3

Justification and search image: Nests are extremely difficult to locate this time of year, and even the most experienced surveyor may miss them, especially if the previous surveys have not been done. During this phase of nesting, the female Swainson's hawk is in brood position, very low in the nest, laying eggs, incubating, or protecting the newly hatched and vulnerable chicks; her head may or may not be visible. Nests are often well-hidden, built into heavily vegetated sections of trees or in clumps of mistletoe, making them all but invisible. Trees are usually not viewable from all angles, which may make nest observation impossible. Following the male to the nest may be the only method to locate it, and the male will spend hours away from the nest foraging, soaring, and will generally avoid drawing attention to the nest site. Even if the observer is fortunate enough to see a male returning with food for the female, if the female determines it is not safe she will not call the male in, and he will not approach the nest; this may happen if the observer, or others, are too close to the nest or if other threats, such as rival hawks, are apparent to the female or male.

Survey Period IV

Survey dates: June 1 – July 15 (fledging)

Survey Time: Sunrise to 1200, 1600 to sunset

Number of Surveys: 3

Justification and search image: Young are active and visible, and relatively safe without parental protection. Both adults make numerous trips to the nest and are often soaring above, or perched near or on the nest tree. The location and construction of the nest may still limit visibility of the nest, young, and adults.

Reporting

Provide the Department and the appropriate lead agency with pre-construction survey results in a written report, within 30 days prior to commencement of construction activities. Report should include date of the report, authors and affiliations, contact information, introduction, methods, study location (include map), results, discussion, and literature cited. For surveys intended to support environmental impact analyses prior to project approval, provide the Department and the lead agency with written survey reports within 30 days of survey completion. Submit California Natural Diversity Database (CNDDDB) forms for any listed, fully protected, or species of special concern countered and positively identified. CNDDDB forms may be found at the following link: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/CNDDDB_FieldSurveyForm.pdf.

Monitoring and Mitigation Plan Recommendations

1. If surveys locate a nest site, prepare a Swainson's hawk Monitoring and Mitigation Plan in consultation with the Department and the appropriate lead agency. Plans should be prepared by a qualified biologist approved by the Department and the appropriate lead agency. Include in the plans detailed measures to avoid and minimize impacts to Swainson's hawks in and near the construction areas. For example:
 - a. If a nest site is found, design the project to allow sufficient foraging and fledging area to maintain the nest site.
 - b. During the nesting season, ensure no new disturbances, habitat conversions, or other project-related activities that may cause nest abandonment or forced fledging occur within 1/2 mile of an active nest between March 1 and September 15. Buffer zones may be adjusted in consultation with the Department and the lead agency.
 - c. Do not remove Swainson's hawk nest trees unless avoidance measures are determined to be infeasible. Removal of such trees should occur only during the timeframe of October 1 and the last day in February.

2. Monitoring plans should include measures for injured Swainson's hawks:
 - a. For hawks found injured during project-related activities on the project site, plans should call for immediate relocation to a raptor recovery center approved by a Department regional representative.
 - b. A system should be set-up so that costs associated with the care or treatment of such injured Swainson's hawks will be borne by the project developer.
 - c. Include appropriate contact information for immediate notification of the Department and the appropriate lead agency of a hawk injury incident. Have approved procedures in place to notify the Department and the lead agency outside normal business hours. Notify the appropriate personnel via telephone or email, followed by a written incident report. Include the date, time, location, and circumstances of the incident in the reports.
3. Mitigation plans should focus on providing habitat management (HM) lands. Lands which are currently in urban use or lands that have no existing or potential value for foraging Swainson's hawks will not require mitigation nor would they be suitable for mitigation. The plans should call for mitigating loss of Swainson's hawk foraging habitat by providing HM lands within the Antelope Valley Swainson's hawk breeding range at a minimum 2:1 ratio for such habitat impacted within a five-mile radius of active Swainson's hawk nest(s). The Department considers a nest active if it was used one or more times within the last 5 years.

Project developers may consider delegating responsibilities for acquisition and management of the HM lands to the Department or a third party, such as a non-governmental organization dedicated to Mojave Desert habitat conservation. Seek approval of such delegations from the Department and the appropriate lead agency.

Approaches for acquisition and management of HM lands:

- a. HM Land Selection Criteria. Identify the region within which lands would be acquired, and the type/quality of habitat to be acquired. Foraging habitat should be moderate to good with a capacity to improve in quality and value to Swainson's hawks, and must be within the Antelope Valley Swainson's hawk breeding range. Foraging habitat with suitable nest trees is preferred.
- b. Review and Approval of HM Lands Prior to Acquisition. Provide an acquisition proposal to the Department and the appropriate lead agency for their approval at least 3 months before acquiring the property. The proposal should discuss the suitability of the property by comparing it to the selection criteria.
- c. Land Acquisition Schedule and Financial Assurances. Complete acquisition of proposed HM lands before initiating ground-disturbing project activities. If an irrevocable letter of credit or other form of security is provided, complete land acquisition within 12 months prior to beginning ground-disturbing project

activities. Provide financial assurances for dedicating adequate funding for impact avoidance, minimization and compensation measures required for project approval (see 3. d. below).

- d. HM Lands Acquisition. Be prepared to provide a preliminary title report, initial hazardous materials survey report, biological analysis, at a minimum to the Department and the appropriate lead agency. The information will likely also be reviewed by the California Department of General Services, Fish and Game Commission and/or Wildlife Conservation Board.

Fee title or conservation easement will likely be transferred to a Department of Fish and Game-approved non-profit third party and the Department, or solely to the Department. Be prepared to support enhancement and endowment funds for protection and enhancement of acquired lands. The Department will approve establishment and management of the funds, ensuring that qualified non-profit organizations or the Department will manage the funds in an appropriate manner. Contributed funds and any related interest generated from the initial capital endowment would support long-term operation, management, and protection of the approved HM lands, including reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and any other action designed to protect or improve the habitat values of the HM lands. Be prepared to reimburse the Department or other entities for all land acquisition costs.

References

Babcock, K.W. 1995. Home range and habitat use of breeding Swainson's hawks in the Central Valley of California. *Journal of Raptor Research* 29:193-197.

Bechard, Marc J. Effect of vegetative cover on foraging site selection by Swainson's Hawk. *The Condor* 84: 153-159.

California Energy Commission and California Department of Fish and Game 2007. California guidelines for reducing impacts to birds and bats from wind energy development. Commission final report. California Energy Commission, Renewables Committee, and Energy Facilities Siting Division and California Department of Fish and Game, Resources Management and Policy Division. CEC-700-2007-008-CMF.

Estep, J.A. 1989. Biology, movements, and habitat relationships of the Swainson's Hawk in the Central Valley of California, 1986–87. California Department of Fish and Game, Nongame Bird and Mammal Section Report.

Woodbridge B, Finley KK, Bloom PH. 1995. Reproductive performance, age structure, and natal dispersal of Swainson's Hawks in the Butte Valley, California. *Journal of Raptor Research* 29:187–192.

Developing Channel Maintenance Programs for Engineered Drainages

1. Maintenance District. Identify a suitable public entity that could serve as a maintenance district to maintain the re-routed channels and flood control structures, manage utility crossings, and undertake all activities needed to preserve the integrity, design, and design discharge capacity of the channels. Include a funding mechanism that would maintain district support activities for the life of the project.
2. Channel Maintenance Program. Prepare a channel maintenance program that would eventually be adopted by the maintenance district. The program would serve as the guideline for routine maintenance activities, as well as capital improvement projects and emergency repairs. The channel maintenance program should include at least the following elements:
 - Purpose and Objectives. Include a discussion of the channel maintenance program main goals (for example, maintenance of the diversion channel to meet its original design to provide flood protection, support mitigation, protect wildlife habitat and provide a wildlife movement corridor, and maintain groundwater recharge).
 - Guidelines for Maintenance. Define standards for acceptable conditions and action triggers for: sediment removal, vegetation/weed management, debris collection, blockage removal, fence repairs, and access road maintenance. Discuss preventative bank protection measures and grade control structure repairs that might be needed to repair eroding banks, incising toes, and scoured channel beds. At a minimum the district would need to implement instream repairs or management actions when the problem (1) causes or could cause significant damage to the project, adjacent property, or the structural elements of the diversion channel, (2) is a public safety concern, (3) negatively affects groundwater recharge, or (4) negatively affects adjacent plant communities or poses a hazard to wildlife. Include a discussion of routine channel maintenance (trash removal and associated debris to maintain channel design capacity; repair and installation of fences, weed management, gates and signs; grading and other repairs to restore the original contour of access roads and levees [if applicable]; and removal of flow obstructions at storm drain outfalls). Describe how capital improvement projects and emergency repairs would be funded and implemented.
 - Reporting. Provide a monitoring and reporting schedule and an outline for annual reports to the appropriate lead agencies.

Attachment III: Local Zoning Ordinance and General Plan Element Examples

Local Zoning Ordinance and General Plan Element Examples

The following compilation is an example of local zoning ordinances and general plan elements that may govern renewable energy development projects located within city or county jurisdictions. The information may assist project developers and agencies by providing specific references to a local jurisdiction's regulations and policies and increasing understanding of local government issues and concerns.

The compilation was extracted from comments, dated January 27, 2010, submitted by Mike Conklin, Inyo County Planning Department Director on the revised draft *Best Management Practices and Guidance: Desert Renewable Energy Projects*.

Zoning Ordinances

Inyo County's zoning ordinance includes specific regulations that may apply to renewable energy development¹ within the County's jurisdiction:

- *Inyo County Code (ICC) Section 18.77 (Water Transfers)* - regulates water transfers between basins in the County, as well as out of the County, through a Conditional Use Permit (CUP) process; requires findings that the water transfer will not unreasonably the overall environment or economy of the County.
- *ICC Chapter 19 (Geothermal Resource Development)* - regulates geothermal resource development, including exploratory wells and production projects, through a CUP process; includes detailed standards regarding setbacks, noise, site restoration, etc.
- *ICC Chapter 15 (CEQA Procedures)* - guides the CEQA review procedures in the County, including providing a detailed list of exemptions.

Amendments to the zoning ordinance may be considered in the near future to address solar and wind energy facilities. Currently, these uses are not specifically mentioned, but would be conditionally permitted in the General Industrial and Extractive Zone (M-I District), as indicated in ICC Chapter 18.57.

General Plan Elements

The County's General Plan includes numerous sections that may be applicable to renewable energy development² located within the County's jurisdiction:

- *Land Use Element* - the Land Use Designation that generally corresponds to the M-I zoning district is General Industrial (GI). Amendments to the General Plan may be considered in the near future to determine the appropriateness of renewable energy development in other Land Use Designations.
- *Circulation Element* - the Roadways and Highways Chapter works towards a safe and efficient transportation system.

¹ The Inyo County code may be accessed online at the following website: <http://www.qcode.us/codes/inyocounty>.

² The Inyo County General Plan may be accessed online at the following website: http://inyoplanning.org/general_plan/index.htm.

- *Conservation/Open Space Element* - the Water Resources Chapter works to protect and restore environmental resources from the effects of export and withdrawal of water resources. The Biological Resources Chapter works to maintain and enhance biological diversity and healthy ecosystems. The Cultural Resources Chapter works to preserve and promote the historic and prehistoric cultural heritage of the County. The Visual Resources Chapter works to preserve and protect unique visual experiences for visitors and residents.

- *Public Safety Element* - the Air Quality Chapter works to promote good air quality, including reducing impacts from dust from Owens Lake and other sources. The Flood Hazard Chapter works to provide adequate flood protection. The Noise Chapter works to limit noise levels from stationary sources, includes noise compatibility standards in Table 9-9, and limits construction near sensitive receptors.

The County is updating its General Plan Government Element, the draft of which includes goals and policies related to renewable energy development³. The draft updated Element includes, amongst others, goals to support renewable energy development and consider, account for, and mitigate ecological, cultural, economic, and social impacts, as well as benefits, from development of such resources.

Others

Other local development programs, regulations, and policies will apply to renewable energy development. For example, many local jurisdictions require minimum traffic operating conditions; in Inyo County, the General Plan works to maintain Levels of Service C on County roadways. The following Inyo County agencies provide additional oversight that may be applicable to renewable energy development⁴ within the County's boundaries:

- *Environmental Health Department* - regulates wells, wastewater disposal, and health and safety.

- *Water Department* - regulates water use, including groundwater withdrawal.

- *Public Works Department* - implements the building code, including reviewing and issuing building and grading permits; reviews projects relative to County facilities, such as traffic impacts.

Since local agencies will bear the burden of providing public services and utilities (such as fire and police protection, emergency response, schools, expanded utilities for employees and new facilities), Inyo County advises that these topics be addressed during project permitting. Also, bonds or other financial sureties for removing abandoned facilities may be required by local governments.

³ Information regarding the Government Element update is available online at the following website: <http://inyoplanning.org/projects.htm>.

⁴ The Environmental Health Department may be reached at 760/878-0238, the Water Department at 760/878-0001, and the Public Works Department at 760/878-0201.

Attachment IV: Native American Heritage Commission Guidance

NATIVE AMERICAN HERITAGE COMMISSION

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October 5, 2009

**TO: Scott Flint, California Department of Fish & Game
Renewable Energy Action Team (REAT)**

Re: NAHC Guidance for Tribal Consultation Requirements and Advisories of Federal and State Statutes for Consideration for the *Best Management Practices & Guidance Manual: Desert Renewable Energy Projects, Cultural Resources Monitoring & Mitigation Plans for the Mojave and Colorado Desert areas of Southern California*

Introduction

Governor Arnold Schwarzenegger issued Executive Order S-14-08 which requires that 33 percent of the energy in California would come from renewable energy resources by 2020 and expedite the Renewable Portfolio Standard (RPS) of eligible renewable energy resources. This Guidance is to assist federal and state 'lead agencies,' to meet tribal consultation requirements of federal and state statutes and regulations.

The California Native American Heritage Commission (NAHC), placed in the California Natural Resources Agency, is the State Trustee Agency for the protection and preservation of Native American cultural resources pursuant to CA Public Resources Code §21070 and *Environmental Protection Information Center v. Johnson* (1985) 170 Cal App. 3rd 604. . A nine-member Commission, all Native American with a requirement that five members be tribal elders, governs the NAHC. The Commission is appointed by the Governor and ratified by the California Senate. This document is proposed to be helpful to federal and state 'lead agencies,' under federal and state environmental laws in providing some practical tools for effective tribal consultation on proposed renewable energy projects. California has the greatest population of American Indian persons, about 330,000, than any other state; about 100,000 are descendants of California's indigenous tribes (please see the 'Map of California Tribal Areas,' **Attachment 1**). There are 109 federally-recognized (by the U.S. Department of the Interior) tribes in California and another 45 Non Federally recognized, but acknowledged as viable tribal governments for the purposes of State of California laws, by the NAHC. While the U.S. Senate never ratified the 18 treaties of 1851-52, with California tribes, there is recognition in state and federal law that California indigenous tribes did own California lands and resources.

Tribal Consultation

Although tribal consultation under the California Environmental Quality Act (CEQA; CA Public Resources Code Section 21000 – 21177) is 'advisory' rather than mandated, the NAHC does request 'lead agencies' to work with tribes and interested Native American individuals as 'consulting parties,' on the list provided by the NAHC in order that cultural resources will be protected. However, the 2006 SB 1059 the state enabling legislation to the Federal Energy Policy Act of 2005, does mandate tribal consultation for the 'electric transmission corridors. This is codified in the California Public Resources Code, Chapter 4.3, and §25330 to Division 15, requires consultation with California Native American tribes, and identifies both federally

recognized and non-federally recognized on a list maintained by the NAHC. Only Native American tribes and interested Native American individuals that are culturally-affiliated to the 'areas' of Potential Effect (APEs) are listed on the NAHC lists. The Native American Contacts list for the Desert Renewable Energy Projects' Cultural Resources Monitoring & Mitigation Plans (CRMMP) is shown as **Attachment 2** to this document. A draft letter to Native American tribes and interested Native American individuals is shown as **Attachment 3**, for consideration.

The NAHC also is a 'reviewing agency' for environmental documents prepared under the National Environmental Policy Act (NEPA; 42 U.S.C 4321 *et seq*). Also, proposed projects that are subject to the Tribal and interested Native American consultation requirements of the National Historic Preservation Act, as amended (Section 106) (16 U.S.C. 470) consultation with Native American tribes and interested Native American individuals, as consulting parties, is mandatory as part of the Section 4(f) project evaluation. In addition, the provision of the Native American Graves Protection and Repatriation Act (NAGPRA) (25 U.S.C. 3001-3013) will also apply to this project if Native American human remains are inadvertently discovered during 'ground-breaking' activity of the project, once the project is permitted to construct.

Cultural Surveys

The California Environmental Quality Act (CEQA) does require that any project that causes a substantial adverse change in the significance of an historical resource, that includes archaeological resources, is a 'significant effect' requiring the preparation of an Environmental Impact Report (EIR) per the California Code of Regulations §15064.5(b)(c)(f) CEQA guidelines). Section 15382 of the 2007 CEQA Guidelines defines a significant impact on the environment as "a substantial, or potentially substantial, adverse change in any of physical conditions within an area affected by the proposed project, including ... objects of historic or aesthetic significance." In order to comply with this provision, the lead agency is required to assess whether the project will have an adverse impact on these resources within the 'area of potential effect (APE)', and if so, to mitigate that effect. The NAHC is of the opinion that the federal standards, pursuant to the above-referenced Acts of the U.S. Congress and the President's Council on Environmental Quality (CSQ; 42 U.S.C. 4371 *et seq*) are similar to and in many cases more stringent with regard to the 'significance' of historic, including Native American items, and archaeological features, including those of Native American origin, than are the provisions of the California Environmental Quality Act (CEQA.) of 1970, as amended. In most cases, federal environmental policy require that any project that causes a substantial adverse change in the significance of an historical resource, that includes archaeological resources, is a 'significant effect' requiring the preparation of an Environmental Impact Statement (EIS). An Environmental Assessment, (EA) prepared under NEPA, defines a significant impact on the environment as "a substantial, or potentially substantial, adverse change in any of physical conditions within an area affected by the proposed project, including ... objects of historic or aesthetic significance." In order for either federal or state 'lead agencies' to comply with this provision, the lead agency is required to assess whether the project will have an adverse impact on these resources within the 'area of potential effect (APE)', and if the project is determined to have an adverse impact on a cultural resources; then, to mitigate that effect of the project. The following are suggestions for ensuring that an adequate 'cultural survey' is done for the CMMP, aware that additional surveys and 'searches' must be done for detailed projects with the Colorado and Mojave Desert sub regions:

1. Review the "Constraints Study of "A Cultural Resource Sensitivity within the California Desert," prepared by Russell L. Kaldenberg, a former Bureau of Land Management (BLM) archaeologist; Russ can be contacted by e-mail at rkaldenberg@asmaffiliates.com;

2. Review the available archaeological files of the Bureau of Land Management (BLM) if available to you; the NAHC is aware that they are extensive;
3. Contact the California Historic Resources Information System (CHRIS), Information Center at the San Bernardino County Museum (Robin Laska, Coordinator; 909-307-0539 or 909-307-2669) for San Bernardino County; and Dr. M.C. Hall, Coordinator; Eastern Information Center at UC Riverside; 951-827-5745, for Riverside County; and David M. Caterino, Coordinator-South Coastal Information Center at San Diego State University, 619-594-5682, for Imperial County; and Dr. Robert Yohe, Coordinator – South San Joaquin Valley Information Center; California State University, Bakersfield, 661-654-2289 for Kern County and the North Antelope Valley. These are all units of the California Office of Historic Preservation, the State Historic Preservation Officer (SHPO), M. Wayne Donaldson (916) 653-7278. In the view of the NAHC, Robin Laska, referred above, will be particularly helpful due to her extensive knowledge of the desert areas of San Bernardino and Riverside counties.
4. Contact the Native American Heritage Commission requesting Sacred Lands File (SLF) searches, from their inventory, separate from that of the CHRIS inventory, established by the California Legislature pursuant to CA Public Resources Code §5097.94(a). The Request Form that may be faxed to the NAHC to 916-657-5390 is shown as **Attachment 4**.

The records searches will determine:

- If a part or the entire APE has been previously surveyed for cultural resources.
- If any known cultural resources have already been recorded in or adjacent to the APE.
- If the probability is low, moderate, or high that cultural resources are located in the APE.
- If a survey is required to determine whether previously unrecorded cultural resources are present.
- If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
- The final report, Environmental Impact Statement, if required, prepared under NEPA guidelines, containing site forms, site significance, and mitigation measures should be submitted immediately to the appropriate planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure.

Mitigation

The California Native American Heritage Commission does prefer “avoidance,” as defined in the California Code of Regulations §15370; if not possible, the following is recommended:

- The NAHC advises the use of Native American Monitors, also, when professional project proponents employ archaeologists or the equivalent, in order to ensure proper identification and care given cultural resources that may be discovered. This recommendation also applies to Phase I of NEPA and the Initial Study for CEQA. In many cases, only a local tribe(s) or Native American individuals or elders may know the existence of a Native American cultural resources.
- Lack of surface evidence of archeological resources does not preclude their subsurface existence.
- Lead agencies should include in their mitigation plan provisions for the identification and evaluation of accidentally discovered archeological resources, per California Environmental Quality Act (CEQA) §15064.5 (f). In areas of identified archaeological sensitivity, a certified

archaeologist and a culturally affiliated Native American, with knowledge in cultural resources, should monitor all ground-disturbing activities.

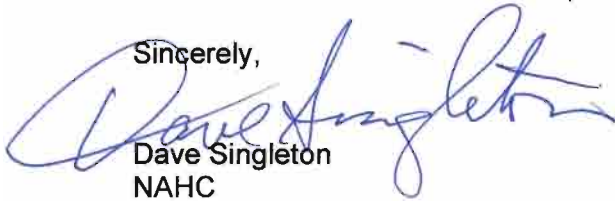
- Again, a culturally affiliated Native American tribe may be the only source of information about a Sacred Site/Native American cultural resource.
- Lead agencies should include in their mitigation plan provisions for the disposition of recovered artifacts, in consultation with culturally affiliated Native Americans.

Conclusion

The NAHC hopes that this Guidance is helpful in identifying the *why, how, and the who* of tribal consultation requirements and advisories of federal and state statutes. A general advisory for accomplishing tribal consultation is included as **Attachment 5** for your use.

Please feel free to contact me at (916) 653-6251 if you have any questions.

Sincerely,

A handwritten signature in blue ink, appearing to read "Dave Singleton".

Dave Singleton
NAHC

Attachments:

1. Map of California Tribal Lands (Page 5)
2. Native American Contact List for the Mojave and Colorado Desert Areas (Page 6)
3. Draft Letter to Native American Tribes (Page 15)
4. NAHC Sacred Lands File (SLF) Request Form (Page 16)
5. 2005 NAHC Consultation Guidelines (Page 17)



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This list is current only as of the date of this document.

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October 5, 2009

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This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Cultural Resources Mitigation Plan (CRMP) Guidance from the Native American Heritage Commission (NAHC) for consideration by the Renewable Energy Action Team (REAT), established by Executive Order #S-14-08 and formalized

Native American Contact

Los Angeles, Kern, Inyo, San Bernardino, Riverside, Imperial Counties
October 5, 2009

Augustine Band of Cahuilla Mission Indians
Karen Kupcha
P.O. Box 846 Cahuilla
Coachella, CA 92236
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916-369-7161

Quechan Indian Nation
Bridget Nash-Chrabaszcz, THPO
P.O. Box 1899 Quechan
Yuma, AZ 85366
b.nash@quechantribe.com
(928) 920-6068 - CELL
(760) 572-2423

Ah-Mut-Pipa Foundation
Preston J. Arrow-weed
P.O. Box 160 Quechan
Bard, CA 92222 Kumeyaay
(928) 388-9456

ahmut@earthlink.net

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

and federal NEPA (42 USC 4321-43351), NHPA Sections 106, 4(f) (16 USC 470(f) and NAGPRA (25 USC 3001-3013)

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Native American Contact

Los Angeles, Kern, Inyo, San Bernardino, Riverside, Imperial Counties
October 5, 2009

Cahuilla Band of Indians
Luther Salgado, Sr.
PO Box 391760
Anza, CA 92539
tribalcouncil@cahuilla.net
915-763-5549

Cahuilla

This list is current only as of the date of this document.
Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code, and federal NEPA (42 USC 4321-43351), NHPA Sections 106, 4(f) (16 USC 470(f) and NAGPRA (25 USC 3001-3013). This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Cultural Resources Mitigation Plan (CRMP) Guidance from the Native American Heritage Commission (NAHC) for consideration by the Renewable Energy Action Team (REAT), established by Executive Order #S-14-08 and formalized

DRAFT LETTER TO NATIVE AMERICAN TRIBES AND INTERESTED NATIVE
AMERICAN INDIVIDUALS ELIGIBLE FOR TRIBAL CONSULTATION UNDER THE
CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA), THE NATIONAL
ENVIRONMENTAL POLICY ACT (NEPA) AND SECTION 106 OF THE NATIONAL
HISTORIC PRESERVATION ACT

DATE:

ADDRESS OF TRIBE OR INDIVIDUAL:

SUBJECT: Re: Tribal
Consultation pursuant to NEPA,
CEQA, NEPA, NHPA SECTION
106 OR OTHER STATE OR
OTHER FEDERAL ACT,
EXECUTIVE ORDER

SALUTATION: DEAR _____:

THIS IS AN INVITATION TO CONSULT ON PROPOSED DEVELOPMENT PROJECTS AT LOCATIONS WITH WHICH YOU HAVE TRIBAL CULTURAL AFFILIATION PURSUANT TO ONE OR MORE OF THE ABOVE REFERENCED FEDERAL OR STATE STATUTES. THE PURPOSE OF THE CONSULTATIONS IS TO ENSURE THE PROTECTION OF NATIVE AMERICAN CULTURAL RESOURCES ON WHICH THE PROPOSED UNDERTAKING MAY HAVE AN IMPACT.

IN THE TRIBAL CONSULTATION PROCESS, EARLY CONSULTATION IS ENCOURAGED IN ORDER TO PROVIDE FOR FULL AND REASONABLE PUBLIC INPUT FROM NATIVE AMERICAN GROUPS AND NATIVE AMERICAN INDIVIDUALS, AS CONSULTING PARTIES, ON POTENTIAL EFFECT OF THE DEVELOPMENT PROJECTS AND TO AVOID COSTLY DELAYS.

FURTHER, WE UNDERSTAND THAT MUCH OF THE CONTENT OF THE CONSULTATION WILL BE CONFIDENTIAL AND WILL INCLUDE, BUT NOT BE LIMITED TO, THE RELATIONSHIP OF PROPOSED PROJECT DETAILS TO NATIVE AMERICAN CULTURAL HISTORIC PROPERTIES, SUCH AS BURIAL SITES, KNOWN OR UNKNOWN, ARCHITECTURAL FEATURES AND ARTIFACTS, CEREMONIAL SITES, SACRED SHRINES, CULTURAL LANDSCAPES INCLUDING TRADITIONAL BELIEFS AND PRACTICES, SOME OF WHICH MAY MEET THE CRITERIA UNDER BOTH THE NATIONAL HISTORIC PRESERVATION ACT 'SECTION 106 ARCHAEOLOGICAL GUIDANCE' (as of 01/01/2009) AND CEQA GUIDELINES §15064.5.

ENCLOSED IS A PACKET OF THE PROPOSED DEVELOPMENT INCLUDING INFORMATION AND APPROPRIATE MAPS FOR YOUR REVIEW. WE WISH TO SCHEDULE A CONSULTATION MEETING WITH YOU INDIVIDUALLY, OR IN A GROUP SESSION, WHICHEVER YOU PREFER. WE WILL CALL YOU NEXT WEEK TO SEE WHICH DATES AND TIME ARE BEST FOR THE CONSULTATION.

SINCERELY,
GOVERNMENT REPRESENTATIVE/AGENT



*California Native
Americans*

Cultural Resources

Strategic Plan

Commissioners

*Federal Laws and
Codes*

*State Laws and
Codes*

*Local Ordinances
and Codes*

*Additional
Information*

*Return to CNHC
Home Page*

Sacred Lands File & Native American Contacts List Request

NATIVE AMERICAN HERITAGE COMMISSION

915 Capitol Mall, RM 364

Sacramento, CA 95814

(916) 653-4082

(916) 657-5390 – Fax

nahc@pacbell.net

Information Below is Required for a Sacred Lands File Search

Project: _____

County: _____

USGS Quadrangle

Name: _____

Township _____ Range _____ Section(s) _____

Company/Firm/Agency: _____

Contact Person: _____

Street Address: _____

City: _____ Zip: _____

Phone: _____

Fax: _____

Email: _____

Project Description: _____

NATIVE AMERICAN HERITAGE COMMISSION

915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
Fax (916) 657-5390
Web Site www.nahc.ca.gov

**NAHC Consultation Guidelines**

April 7, 2005

In order to further the goals of protecting Native American cultural features and the recognition of California Native Americans' interest in preserving and protecting those features through consultation, the Native American Heritage Commission recommends the establishment of a cooperative relationship between appropriate tribal governments and Agency or Department officials that considers and respects the views of all participants and acknowledges the goal of developing mutually acceptable cultural feature protection strategies.

Consultation should be viewed as "the right to have a seat at the table, a chance to persuade the responsible ... official to do the right thing."¹

For many Agency or Department officials, consulting with Native American tribes will be a new experience that draws upon little from prior experience. There are cultural differences that need to be respected throughout the process. Indian people may be more accustomed to an oral tradition rather than a written tradition, potentially making what and how things are said during consultation mean far more than the written documents or agreements that will result from the consultation. All tribes, whether federally recognized or non-federally recognized, should be regarded as unique and independent governmental entities with traditions and hierarchical structures that must be recognized and respected. Appropriate tribal protocols should be followed when approaching tribal governments. More than one tribe may have a cultural affiliation with the proposed project area; agency officials should be prepared to hold concurrent consultation sessions if a combined consultation format is not acceptable to the tribes.

Agency officials must be aware that the consultation process is in no way intended to affect, diminish or reduce the sovereign status of any California Native American tribe.

The following are recommendations for Agency or Department use in initiating the consultation process with tribes.

1. Before the need for consultation arises, the following strategies are recommended:

- Agencies or Departments or Departments should designate an official with principal responsibility for carrying out consultation activities. Agencies or Departments should seek to appoint a designee with knowledge of California Native American culture who has direct access to Agency or Department decision-makers.
- Agencies or Departments should obtain from the NAHC the lists of appropriate tribes with potential for interest in property within the Agency or Department's jurisdiction.

¹ Professor Dean Suagee, "Historical Storytelling and the Growth of Tribal Historic Preservation Programs," 17 Natural Resources and Environment 86, 88 (2002).

- Agencies or Departments should complete a records search on the area of potential effect with the California Historic Resource Inventory System (CHRIS) and the Native American Heritage Commission's Sacred Lands File. The results of such searches should be shared with the tribe during the request for consultation, including the likelihood that cultural features might be present, thus demonstrating the Agencies or Departments' awareness that sensitive cultural features may be present that could be threatened by the proposed project or activity. The lack of recorded archeological or cultural/sacred resources should not be presumed to preclude the existence of cultural features within the area of potential effect.
- The Agency or Department designee should serve as the primary contact for consultation with tribes in order to facilitate the development of an on-going working relationship between the appropriate tribal governments and the Agency or Department.
- Agencies or Departments should never assign their consultation responsibilities to a contractor or developer.
- Agency officials should initiate contact directly with the tribe's officially chosen leader (e.g. chairperson, spokesperson, captain, etc.) to ask if tribal consultation protocols are already in place. Such protocols may specify cultural resource contacts within the tribe, procedures, time limits, restrictions, etc.
- If protocols are not available, the Agency or Department should seek assistance from tribal officials to identify the appropriate procedures to follow in meeting the tribe's consultation needs.
- Development of mutually agreed-upon protocols may result in more effective consultation efforts with individual tribes.
- Either the Agency or Department or the tribe may request revisions to the protocols with prior notice.

2. Consultation is intended to address the preservation and mitigation of impacts to California Native American historic, cultural, or sacred sites, as are defined in Public Resources Code 5097.9 and Public Resources Code 5097.993, including sites that are listed or may be eligible for listing in the California Register of Historic Resources, historic or prehistoric ruins, burial grounds, any archaeological, prehistoric or historic Native American rock art, any archaeological, prehistoric or historic features, inscriptions made by Native Americans at such a site, places of worship, sacred or ceremonial sites, and sacred shrines on public and private properties. The process is focused on identifying issues of concern to Native American tribes, including cultural values, religious beliefs, traditional practices and legal rights of Indian people, and on defining the full range of acceptable alternatives.

Consultation is intended to accommodate religious considerations, rather than endorse them. The courts have ruled that consultation regarding issues of Native American religious importance is not a violation of the Establishment Clause of the U.S. Constitution.²

Effective consultation comes from the development of relationships that are ongoing and sustained. Improved relations with tribes can improve the effectiveness of consultation. A critical factor in the process is the understanding that consultation, in all forms, is an ongoing process rather than a single event.

General requirements:

² 113 Yale Law Journal, 1623, Page 2.

- Consultation is defined in Government Code Section 65352.4 as the “meaningful and timely process of seeking, discussing, and considering carefully the views of others...” Consultation involves conduct that is mutually respectful of all parties, recognizes all parties’ cultural values, incorporates the parties’ needs for confidentiality, and seeks agreement on the resolution of the concerns raised.
- Consultation should be done prior to the public review process and as early as possible.
- Consultation should be done face-to-face whenever possible and should not take place in a public forum.
- When an Agency or Department first seeks to consult on a project, its initial inquiry should be made to the tribe’s officially chosen leader. A department head or higher should make the initial request.
- Once the tribe has agreed to consult, consultation should take place between the Agency or Department’s designee(s) and a tribal representative(s) who has been identified through a letter from the tribe’s presiding officer or a Tribal Council resolution.
- Agency or Department officials should be cognizant of the fact that most tribes were relocated to isolated locations, far from city centers, busy highways, and from their territories of cultural affiliation. Travel required for consultation may be time-consuming and, in the case of tribes along the Colorado River, may involve changes in time zones. Agency or Department officials should seek to accommodate the tribe’s schedules and to share the burden of travel.
- Agency or Department officials should be aware that the confidentiality of many Native American cultural features is critical to tribal culture and that many tribes will seek confidentiality assurances prior to divulging information about those sites.

Conducting consultation:

- Consultation should be viewed as a process, rather than a single event and an Agency or Department should be prepared to continue consultation throughout the duration of a project
- Simply notifying a tribe is not the same as consultation. A 1995 federal court ruling held that written correspondence requesting consultation with a tribe was not sufficient for the purpose of conducting consultation as required by law, but that telephone calls or more direct forms of contact may be required. In *Pueblo of Sandia v. United States*, 50 F.3d 856 (10th Cir. 1995), the court held that the U.S. Forest Service had not fulfilled its consultation responsibilities under the National Historic Preservation Act by merely sending letters to request information from tribes.
- Agency or Department officials should begin consultation with tribes at the earliest point possible in the project planning process
- All attempts to contact a tribe regarding consultation should be well documented, including letters, telephone calls, and direct meetings. Any returned or unanswered correspondence should be retained in order to verify the Agency or Department’s efforts to communicate. Documentation of notification and consultation requests should be included in the Agency or Department’s public record.
- Agency or Department officials should be aware that tribes may require a significant period of time to respond to a consultation request.
 - Often tribal councils meet only once a month; all formal positions taken by the tribe will usually require approval of the tribal council.

- Agency or Department officials should be aware of the potential for vast differences in tribal governments' capabilities (especially between federally-recognized and non-federally-recognized tribes), different tribes' staffing capabilities, and resources. Some may be able to respond more promptly and efficiently than others.
- Agency or Department officials should be sensitive to the fact that many tribes are subject to numerous demands on their small staffs, including requirements of the federal, state, and Agency or Department.
- Consultation requests should include a clear statement of purpose, explaining the reason for the request and declaring the importance of the tribe's participation in the project planning process. The request should specify the location of the project area of potential effect.
- Consultation requests should provide as much detail about the proposed plan as possible, presented in layman's terms, including maps of the affected area and a description of the nature of anticipated impacts. Failure to disclose pertinent information may provide grounds for a legal challenge to the Agency or Department's plan.
- Consultation should involve listening to tribal concerns with the goal of accommodating Native American religious practices.³
- Consultation should produce enforceable results that reflect the efforts made to achieve a mutually agreeable outcome.
- All aspects of the consultation process should be documented, including how the agency reaches a final decision.
- Upon conclusion of consultation, the Agency or Department should notify all consulting tribes of the proposed decision, specifically discussing the basis for the decision, the relationship to tribal concerns, and outlining the process for tribes to challenge the draft plan prior to its final approval.

3. Procedures to identify tribes through the NAHC.

Consultation requires communicating directly with tribes. The NAHC's role is to facilitate consultation and to provide assistance to tribes and an Agency or Department. The NAHC will provide contact information for all culturally affiliated tribes, including those with overlapping territories.

- When Agency or Department projects are first proposed, the Agency or Department should send written requests to the NAHC asking for a list of appropriate tribes in their area for consultation. The Native American Heritage Commission will provide the Agency or Department with a list of appropriate California Native American tribes comprised of federally-recognized and non-federally recognized tribes found on the NAHC's consultation list. The appropriate groups will be those that have a cultural affiliation to a specific geographic area.
- Requests should include the specific location of the area proposed for development.

³ 113 Yale Law Journal 1623, page 12

4. Consultation to address appropriate methods of treatment and management of cultural features.

- An Agency or Department should not ask tribes to prioritize sites for the purpose of protection.
- An Agency or Department should be prepared to consider a broad range of mitigation options, including avoidance, development of habitat and open space properties, or alternative means of preserving Native American cultural features intact whenever possible.
- An Agency or Department should be prepared to discuss tribal involvement in the treatment and management of cultural features through monitoring, co-management, and other forms of participation.
- The planning of treatment and management activities should address the possibility that Native American human remains may be involved when protecting cultural features. An Agency or Department should work with the tribe to identify and plan for appropriate treatment of such discoveries, in accordance with Public Resources Code Section 5097.98.

5. Procedures to protect confidentiality.

- Any information submitted by tribes must remain confidential and exempt from public disclosure laws, to the extent authorized by law.
- Procedures must be established to allow for tribes to share information with Agency or Department officials in a confidential setting, rather than requiring discussion in a public meeting.
- Agencies or Departments should develop their own “in-house” confidentiality procedures.
- Any documents or portions of reports specifically detailing the cultural feature or area proposed for protection by the tribe through an open space designation must be kept confidential.
- Only those tribal designees, Agency or Department officials, qualified archaeologists, and land managers involved in the particular planning activity may obtain information about a given site.
 - The consulting parties may wish to develop their own criteria for the limited release of confidential information related to the site.
- Anyone requesting confidential site information from the Agency or Department should first provide identification and sign a nondisclosure agreement in conformance with existing law, and, if necessary, establish their “need to know.” Disclosure to any second parties must also be prohibited under terms of the nondisclosure agreement.

Terms for confidentiality may differ depending upon the nature of the site, the tribe, the Agency or Department’s mission, or who proposes to protect the site. The Agency or Department should collaborate with tribes to develop informational materials for field managers regarding the cultural sensitivity of divulging site information, explaining the tribe’s interest in maintaining the confidentiality and preservation of a site. Land managers should be informed that Public Resources Code Section 5097.993 establishes criminal penalties for the unlawful and intentional destruction, degradation, or removal of Native American cultural or spiritual places located on public or private lands.

Miscellaneous

- Agencies or Departments are encouraged to adopt policies or procedures, in consultation with the appropriate tribe(s), to protect Native American cultural features, to protect the confidentiality of information exchanged between the tribe and the Agency or Department regarding cultural features, to provide penalties for the unauthorized disclosure of confidential information, and for appropriate treatment and management of Native American cultural features.
- Agencies or Departments should consider development of preservation plans for cultural features within their jurisdictions in accordance with established cultural resource protection standards.
- The Agency or Department's representative should be encouraged to attend Tribal Council or tribal planning meetings, where appropriate and when invited, in order to become familiar with tribal government operations and to facilitate relationship building.
- Consultation may include discussion of mitigation measures, including the preferred alternative of avoidance, as recommended in Section 15370 of the CEQA Guidelines.
- When the consulting tribe finds mitigation banking to be an acceptable form of mitigation for the loss of gathering/collecting areas, an Agency or Department may wish to consider land banking that fosters the development of permanently protected gathering and collection areas through transplantation, irrigation, or other means.
- Appropriate tribal governments and the Agency or Department should consider the benefits of recording protected sites with NAHC or CHRIS system, with designation to indicate that the site is Native American. Burial sites or sites of a sacred or spiritual value should be listed with the NAHC; sites of historic or prehistoric nature should be listed with the CHRIS.

**Attachment V: Environmental Stakeholders'
Renewable Siting Criteria: California Desert
Conservation Area**

Audubon California
California Native Plant Society * California Wilderness Coalition
Center for Biological Diversity * Defenders of Wildlife
Desert Protective Council * Mojave Desert Land Trust
National Parks Conservation Association
Natural Resources Defense Council * Sierra Club * The Nature Conservancy
The Wilderness Society * The Wildlands Conservancy

Renewable Siting Criteria for California Desert Conservation Area

Environmental stakeholders have been asked by land management agencies, elected officials, other decision-makers, and renewable energy proponents to provide criteria for use in identifying potential renewable energy sites in the California Desert Conservation Area (CDCA). Large parts of the California desert ecosystem have survived despite pressures from mining, grazing, ORV, real estate development and military uses over the last century. Now, utility scale renewable energy development presents the challenge of new land consumptive activities on a potentially unprecedented scale. Without careful planning, the surviving desert ecosystems may be further fragmented, degraded and lost.

The criteria below primarily address the siting of solar energy projects and would need to be further refined to address factors that are specific to the siting of wind and geothermal facilities. While the criteria listed below are not ranked, they are intended to inform planning processes and were designed to provide ecosystem level protection to the CDCA (including public, private and military lands) by giving preference to disturbed lands, steering development away from lands with high environmental values, and avoiding the deserts' undeveloped cores. They were developed with input from field scientists, land managers, and conservation professionals and fall into two categories: 1) areas to prioritize for siting and 2) high conflict areas. The criteria are intended to guide solar development to areas with comparatively low potential for conflict and controversy in an effort to help California meet its ambitious renewable energy goals in a timely manner.

Areas to Prioritize for Siting

- Lands that have been mechanically disturbed, i.e., locations that are degraded and disturbed by mechanical disturbance:
 - Lands that have been “type-converted” from native vegetation through plowing, bulldozing or other mechanical impact often in support of agriculture or other land cover change activities (mining, clearance for development, heavy off-road vehicle use).¹
- Public lands of comparatively low resource value located adjacent to degraded and impacted private lands on the fringes of the CDCA:²
 - Allow for the expansion of renewable energy development onto private lands.
 - Private lands development offers tax benefits to local government.
- Brownfields:
 - Revitalize idle or underutilized industrialized sites.
 - Existing transmission capacity and infrastructure are typically in place.

- Locations adjacent to urbanized areas:³
 - Provide jobs for local residents often in underserved communities;
 - Minimize growth-inducing impacts;
 - Provide homes and services for the workforce that will be required at new energy facilities;
 - Minimize workforce commute and associated greenhouse gas emissions.
- Locations that minimize the need to build new roads.
- Locations that could be served by existing substations.
- Areas proximate to sources of municipal wastewater for use in cleaning.
- Locations proximate to load centers.
- Locations adjacent to federally designated corridors with existing major transmission lines.⁴

High Conflict Areas

In an effort to flag areas that will generate significant controversy the environmental community has developed the following list of criteria for areas to avoid in siting renewable projects. These criteria are fairly broad. They are intended to minimize resource conflicts and thereby help California meet its ambitious renewable goals. The criteria are not intended to serve as a substitute for project specific review. They do not include the categories of lands within the California desert that are off limits to all development by statute or policy.⁵

- Locations that support sensitive biological resources, including: federally designated and proposed critical habitat; significant⁶ populations of federal or state threatened and endangered species,⁷ significant populations of sensitive, rare and special status species,⁸ and rare or unique plant communities.⁹
- Areas of Critical Environmental Concern, Wildlife Habitat Management Areas, proposed HCP and NCCP Conservation Reserves.¹⁰
- Lands purchased for conservation including those conveyed to the BLM.¹¹
- Landscape-level biological linkage areas required for the continued functioning of biological and ecological processes.¹²
- Proposed Wilderness Areas, proposed National Monuments, and Citizens' Wilderness Inventory Areas.¹³
- Wetlands and riparian areas, including the upland habitat and groundwater resources required to protect the integrity of seeps, springs, streams or wetlands.¹⁴
- National Historic Register eligible sites and other known cultural resources.
- Locations directly adjacent to National or State Park units.¹⁵

EXPLANATIONS

¹ Some of these lands may be currently abandoned from those prior activities, allowing some natural vegetation to be sparsely re-established. However, because the desert is slow to heal, these lands do not support the high level of ecological functioning that undisturbed natural lands do.

² Based on currently available data.

³ Urbanized areas include desert communities that welcome local industrial development but do not include communities that are dependent on tourism for their economic survival.

⁴ The term "federally designated corridors" does not include contingent corridors.

⁵ Lands where development is prohibited by statute or policy include but are not limited to:

National Park Service units; designated Wilderness Areas; Wilderness Study Areas; BLM National Conservation Areas; National Recreation Areas; National Monuments; private preserves and reserves; Inventoried Roadless Areas on USFS lands; National Historic and National Scenic Trails; National Wild, Scenic and Recreational Rivers; HCP and NCCP lands precluded from development; conservation mitigation banks under conservation easements approved by the state Department of Fish and Game, U.S. Fish and Wildlife Service or Army Corps of Engineers a; California State Wetlands; California State Parks; Department of Fish and Game Wildlife Areas and Ecological Reserves; National Historic Register sites.

⁶ Determining “significance” requires consideration of factors that include population size and characteristics, linkage, and feasibility of mitigation.

⁷ Some listed species have no designated critical habitat or occupy habitat outside of designated critical habitat. Locations with significant occurrences of federal or state threatened and endangered species should be avoided even if these locations are outside of designated critical habitat or conservation areas in order to minimize take and provide connectivity between critical habitat units.

⁸ Significant populations/occurrences of sensitive, rare and special status species including CNPS list 1B and list 2 plants, and federal or state agency species of concern.

⁹ Rare plant communities/assemblages include those defined by the California Native Plant Society’s Rare Plant Communities Initiative and by federal, state and county agencies.

¹⁰ ACECs include Desert Tortoise Desert Wildlife Management Areas (DWMAs). The CDCA Plan has designated specific Wildlife Habitat Management Areas (HMA) to conserve habitat for species such as the Mohave ground squirrel and bighorn sheep. Some of these designated areas are subject to development caps which apply to renewable energy projects (as well as other activities).

¹¹ These lands include compensation lands purchased for mitigation by other parties and transferred to the BLM and compensation lands purchased directly by the BLM.

¹² Landscape-level linkages provide connectivity between species populations, wildlife movement corridors, ecological process corridors (e.g., sand movement corridors), and climate change adaptation corridors. They also provide connections between protected ecological reserves such as National Park units and Wilderness Areas. The long-term viability of existing populations within such reserves may be dependent upon habitat, populations or processes that extend outside of their boundaries. While it is possible to describe current wildlife movement corridors, the problem of forecasting the future locations of such corridors is confounded by the lack of certainty inherent in global climate change. Hence the need to maintain broad, landscape-level connections. To maintain ecological functions and natural history values inherent in parks, wilderness and other biological reserves, trans-boundary ecological processes must be identified and protected. Specific and cumulative impacts that may threaten vital corridors and trans-boundary processes should be avoided.

¹³ Proposed Wilderness Areas: lands proposed by a member of Congress to be set aside to preserve wilderness values. The proposal must be: 1) introduced as legislation, or 2) announced by a member of Congress with publicly available maps. Proposed National Monuments: areas proposed by the President or a member of Congress to protect objects of historic or scientific interest. The proposal must be: 1) introduced as legislation or 2) announced by a member of Congress with publicly available maps. Citizens' Wilderness Inventory Areas: lands that have been inventoried by citizens groups, conservationists, and agencies and found to have defined “wilderness characteristics.” The proposal has been publicly announced.

¹⁴ The extent of upland habitat that needs to be protected is sensitive to site-specific resources. For example: the NECO Amendment to the CDCA Plan protects streams within a 5-mile radius of Townsend big-eared bat maternity roosts; aquatic and riparian species may be highly sensitive to changes in groundwater levels.

¹⁵ Adjacent: lying contiguous, adjoining or within 2 miles of park or state boundaries. (Note: lands more than 2 miles from a park boundary should be evaluated for importance from a landscape-level linkage perspective, as further defined in footnote 12).



BEST MANAGEMENT PRACTICES AND GUIDANCE MANUAL

DESERT RENEWABLE
ENERGY PROJECTS